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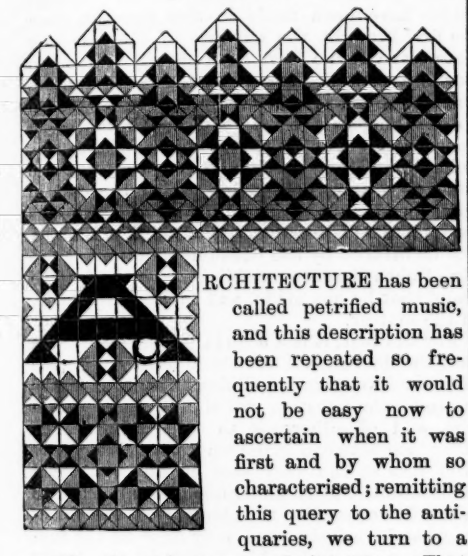
On the Rights and the Reasons of Rhythm in Architecture.



ARCHITECTURE has been called petrified music, and this description has been repeated so frequently that it would not be easy now to ascertain when it was first and by whom so characterised; remitting this query to the antiquaries, we turn to a consideration of more real interest. That the paradox has been repeated so frequently may be taken as pretty certain evidence that, like many another paradoxical saying which has obtained favour and currency, there is some true analogy lurking beneath terms which in themselves have the air of only pretending to the merit of an epigram. Music and Architecture are arts which doubtless by the relations which they severally deal with, stand in as essential contrast as Time and Space, as the absolutely permanent and the continuously fleeting. To bring them into comparison may seem as hopeless as to find a ratio between the date of the year and the height of the wall of China. Many things occur in Time which cannot in any proper sense be said to have an existence with relations in Space; and space is occupied by things of another class and nature which are stable facts and in no sense whatever to be interpreted as events. Nevertheless, the analogy which exists between these two modes of physical relation, like the association which is established between them in our ordinary experience, is exceedingly intimate. The impress of this pervading analogy is recognised unmistakably in the very earliest forms of language. The qualities of space which are chiefly and primarily appreciated by the sense of touch, are freely transferred by analogy to the various modes of essentially intangible time. Time is spoken of as long or short, and no incongruity is suggested by even such a phrase as a short space of time. It is in our experience and observation of motion that the two conceptions of space and time are so absolutely concurrent as to seem to finally blend. When the motion of an object is equable, any proportion of the total space traversed corresponds with a like proportion of the whole time occupied by the transit. And combinations of longer and shorter periods of time occupied by different incidents, may agree with the longer and shorter successive lines of an object in varied directions, as we witness in the movements of the *bâton* of a musical conductor or the evolutions of a *corps de ballet*. Hence, it is found natural to speak of the successions of incidents as movements, even when no change of place whatever is in question; and we call a series of sounds, harsh and rugged, or smooth and flowing, without any sense of the fact that we are using language metaphorically. Again, it is by a convenient extension of this principle that we apply descriptive epithets involving the idea of motion, to combinations of form which are presented immutably in space. This is only apparently the case when we speak of an architectural composition as harmonious. It is true that harmony has its most familiar illustration in prolonged combinations of musical sounds; but still, the word itself, in its original appropriation among the Greeks, has even closer dependence on the primary idea of aptly "fitted" elements of solid construction. But we have a precise example of unhesitating application of terms expressive of motion to architecture when Vitruvius, copying the Greeks, requires that a fine building shall be not only symmetrical, but rhythmical,—shall have the quality of eurhythmia,—of exquisite rhythm. The proper meaning of the word rhythm is flow, and, as used with intention, agreeable or suitable flow or flowingness; that is, appropriate and pleasing progressive movement of a liquid in space. So far as the word rhythm strictly postulates change of position in space, it might seem to be more violently applied to words or notes than to material objects; but words and musical notes are accompanied, as they are produced, by material movements, and the rhythm of the dancer's movements is easily ascribed to the regulated changes of the musical measure with which he accurately keeps time. We are more likely to be brought to a stand and pause upon the propriety with which the quality of flowingness is ascribed to the design of a great work of architecture.

Not much aid towards clearing our ideas upon the subject is obtainable from the treatment of it by Vitruvius in the second chapter of his first book. From the Greek equivalents that he introduces, it is evident that he is at once extracting and epitomising some Greek authority; but equally clear from the manner in which some of his definitions interfere with and run into each other, that his authority suffers at his hands, or was,—the less likely supposition,—originally defective. We have to interpret what is stated so confusedly, by independent consideration of what the interest of the subject would naturally and necessarily require to be said. With a little assistance of this kind, we can discern in the Latin text the scattered hints of a dismembered theory based on classification which was originally systematic and even scientific, and have good hope of restoring and repiecing whatever in it was of most importance.

Excellence in the rhythmic ordination of a structure was subordinate to its leading symmetry, while mainly and indispensably conducive to the beauty of symmetrical effect. Having taken our cue so far from Vitruvius, it will not be necessary or helpful at the present time to cite him further,—and probably it may not be worth while later on to call upon him to explain himself in the fuller light obtained, without his assistance.

Symmetry, translated literally, is agreement in respect of measurement, and is for the most part predicated of an important composition in respect of its very broadest lines of comparison. Taken in the strictest and most limited sense, it implies the positive correspondence known as bilateral symmetry, when two halves repeat each other on either side of a median line. This formal regularity is as prevalent in nature as in art; in a horse or an elephant, as in a rose-leaf; in the Sainte Chapelle as in St. Paul's. But even in these cases the value of symmetry as expressing the proper bond and unity of a concluded totality, depends on the fact that it harmonises diversity. The presentation of the two halves is so far contrasted that whatever member lies to the right on one side is to the left on the other. A simple square pile of masonry has no more claim to be symmetrical in the proper sense than a mere heap of stones; it may be divided into equal halves by a central vertical line, but it might be halved as absolutely by a horizontal line, and in either case the halves would admit of transposition or might be accurately superposed; aggregation only is in question in such a case, not composition. True symmetrical composition is only effected when the disruption of the corresponding halves would involve destructive separation of component parts which have their subordinate but still important unity. If we divide the compound roseleaf along the line of its midrib, we are left with the terminal and characteristic leaflet torn apart, and to divide the west front of Cologne Cathedral by a central vertical line would be to find ourselves left with useless and unmeaning and impossible half-windows and half-doorways. Composition in the sense of effective combination is still more stringent when no important division of the lateral halves can assert independent bilateral symmetry. In the western front of the Cathedral of Paris the flanking towers and apertures below are no less susceptible of division into similar halves by a median line, than the intermediate portion which gives entrance and light to the nave. But elsewhere, and, for example at Cologne, a different principle is adopted, and the lateral divisions are no longer susceptible of symmetrical halving by a central line, whatever may be the case with their component elements, a window or a door taken separately, any more

than the right and left sides of an animal organism.

It is manifest that the principle which is here involved may be, and indeed constantly is, made available for keeping together the members of an extensive composition, for retaining divisions of secondary importance in due subordination and visible dependence. Whitehall may be cited as an admirable example of refined management in this respect; the wings, so to style the lateral divisions including pairs of windows, are just sufficiently independent to give contrast to the centre, and not so much so as to suggest the thought of liability to detachment.

It is precisely at this point that the consideration of symmetry leads on to that of architectural rhythm. Symmetry in architecture is statical and rhythm dynamical. The contrast is that between stability and motion; between fixedness and transition. Composition is nought unless it brings us round to the repose of perfect satisfaction in contemplation of a definite whole; but a whole is but dull or wearisome unless it comprises enticements for us to dwell with pleasure on particular parts, leads us on from one to another, and so after commencements from various points successively, to be conducted again "by many a winding bout," to enhanced delight in appreciation of concentrated beauty, of focalised power. Rhythmical flow is brought in upon us when we listen to the strains of music; but the sense of accentuated progression is the same when it is by our own transference of attention, from point to point, that we receive impressions of easy and graceful, or in any case of characteristic, transition. Movement is brought home to us indistinguishably whether we ascribe it to a constellation, — to "the great Orion, slowly sloping towards the west," or care to reflect that the true change of place is that of the earth we stand on.

Rhythm in architecture therefore is a certain regulated arrangement of the secondary and subordinate members and details of a composition, effectuating combinations in harmonious relation to each other, a flow of transition satisfactory and characteristic. Rhythm, in consequence, is both complex and variously comprehensive, as it applies to more simple groups of elements or assemblages of groups. We recognise it in the proportioned succession of orders of arch mouldings, as in Wimborne Minster; of closer or more open forms in window tracery; in the relation of voids to solids;—of voids to voids, as of lateral portals to a central, or of portal to window openings; of solids to solids, as of entablature to podium, or buttress to roof.

It would, therefore, appear that the best and truest sense of architectural rhythm will be given when certain controlling proportions regulate the design of subordinate members; and then when those members again are associated in obedience to a principle of proportion which is either the same, or not indistinctly related to that which has already been made available in details.

The responsibility of the architectural artist in respect of rhythm will be best appreciated by comparing it with that of his brother of the brush. If we analyse our sense of rhythmical satisfaction in contemplating one of the masterpieces of the great epoch of Italian painting, we find that it depends on the artful relation of individual figures to each other in a group, then of one group to other adjacent groups; and, finally, of sets of groups to each other advancing more or less directly to a final consummation in one ultimate equation. Every group has a certain coherence within itself, yet betrays withal an incompleteness that marks dependence on another, that indicates incompleteness, and so sends us onward in expectation of a relieving and satisfying transition, a rhythmical succession. The charm of such successions resides in duly attempered variation, in diversity supervening on agreement, in similarity which is not mere tame repetition, and novelty that does not shock by unprepared abruptness. The true secret of rhythm, therefore, be it pictorial, musical, metrical, or architectural, must be a matter of proportion. So far as concerns combinations of colours in painting, the determination of proportion in the relations of tints and depths of hues can only be left to the instinctive appreciation of the painter's eye and touch; as regards music again, though successful rhythmical effect can no doubt justify itself by demonstrated relation to strict mathematical laws, the inventor of an original melody may be credited with accuracy no less spontaneous in the succession of his measures, than the painter in distributing the reflected light of his sunset. In the case of architecture, the primary responsibility for effective rhythm will no doubt also rest with imagination. The architect, like the musician, like the painter, nay like the poet, must be "of imagination all compact," as his function also is "to body forth the form of things unknown"; but when he applies himself to the task of turning them to definite shape and giving to his airy nothings local habitation and solid reality, unlike his brother artists he must needs deal with proportions by compass and protractor, by numerical calculation and a scale that admits allegiance ultimately to a box-wood rule.

Let us endeavour to bring these more abstract generalities to the test of concrete application. The sense of rhythm has the best opportunity to be gratified, the most serious liability to be outraged, by the good or the ill proportion amongst themselves of features and distributions which, not only by their importance, but their similarity or analogous relations, thrust themselves forward for comparison. Such may be said to be in a Gothic cathedral the widths of the nave and aisles, and their proportionate loftiness, and the proportionate acuteness of their arcuation together with that of the lateral openings between the piers of the nave. Architecture probably does not supply an example in any part of Europe, of a more delightful rhythmical gradation in all these respects than we admire in Westminster Abbey. The triforium arcade still further falls into eurhythmic sequence with an enhancement of the harmony which will leave those who can happily appreciate it, under no difficulty as to the theoretical analogy between music and architecture. A glance at the triforium arches of Salisbury Cathedral is a counter-example, so harshly discordant are their proportions with the pier arch below them. It is in rhythmical sequence that the charm resides of which we are sensible as we approach St. Paul's. The union of the central colonnade with the flanking towers, the gradation between the upper and the lower orders, the retention of the entire façade in subjection to the supreme dignity of the cupola, and the relation established by the intermediate forms of the attendant campaniles, produce a series of impressions of satisfaction equivalent in effect to the harmony of a sequence of movements or of sounds. It is when we enter and pass up an aisle which, narrow already, is narrowed, is choked still more, and suddenly, as it opens into the generous circle of the central area, that faulty rhythm tells upon us as painfully as when we walk arm in arm with one who does not keep step, or still worse when dancing with a partner destitute of a sense even of the time of the music. This awkwardness is admirably evaded in the transition to the octagon at Ely. One further illustration is all that we have room for. As regards the essential principle of rhythm the grouped architectural elements of a Gothic nave are analogous to those of a Doric portico. Pairs of metopes, which were originally perforate, are grouped by falling within the single interval of a pair of columns below them; even as the paired triforium windows of Lincoln or Westminster, are comprehended within the single bay marked out by the arch between a pair of piers. Both columns and piers fall into groups again in virtue of certain simple proportions of height to spacing, which do not tell the less effectively on our sensibility to grace, because they are not decisively marked and insisted on. In both cases monotony is avoided by a limit being given to indefinite protraction of a series of similars, and a sequence of rhythmical phrases becomes a concentrated expression by returning upon a distinctive terminal group, with all the value of a musical cadence.

A Narrow Escape.—The fine old parish church of Talland, near Polperro, Cornwall, had on Sunday last a very narrow escape from being burned to the ground. As the two daughters of the Rev. George Hales entered the church to arrange the music and other things for service, they found a portion of the flooring to be on fire. Closing the doors immediately they ran for assistance, and the fire was extinguished and the smoke dispersed before the commencement of morning service. The fire is stated to have originated in the close proximity of a stove to some woodwork.

DETERMINATION OF THE LAW OF WATER RATING.

A WATER-CONSUMERS' DEFENCE COMMITTEE.

The final determination by the House of Lords, on the 30th ult., of the law of rating as applicable in the case of water companies, is of the first importance to all the householders and water consumers of London. For ourselves, the decision has the special value that it places beyond the range of controversy the value of the advice which, for a series of years, we have respectfully ventured to urge upon our London readers. It is not by crying to Parliament or to the Government for aid that the inhabitants of London are likely to obtain either purer, cheaper, or more abundant water. That there have been cases,—perhaps many cases,—of bad service, or of what may now be called unjust imposition, on the part of the water companies, our own columns have on repeated occasions shown; but we live in an age in which public spirit has almost everywhere sunk into the decrepit condition of party spirit, and it is idle, or worse than idle, for London to expect to have its water-supply improved on public and disinterested grounds. The three or four attempts which have been made in this direction since we first brought the outlines of the case fully before the public have been happily frustrated; nor do we think that the passage of either of the measures to which we refer would have led to anything better than the perpetration of an enormous job, and the saddling of the metropolis with higher charges for no better service than at present. It is by taking the case in their own hands, and coming to fair terms, as customers and purveyors, that needful reforms can be insured by the consumers of water; and Mr. Dobbs deserves public gratitude for the stand that he has made, and successfully made, in the matter.

For the rest, it is a scandal to our civilisation that the door should have been left open for the dispute. No genuine difficulty existed in the matter,—the question was simply one of definition, and of adherence to stipulations. The difference between gross and net value of any kind lies at the very root of all commercial transactions. It is understood by all business men. It enters into the elements of every contract, and confusion can only arise on the subject from unpardonable laxity in the terms either of a contract or of the law under which it is made; or else from the attempts of one of the parties to the contract to take an unfair advantage of the other party. Our Blue Books actually groan under the mass of correspondence as to the question whether the Suez Canal Company were entitled to charge 10 francs per ton on the gross or on the net tonnage of the vessels passing through their canal. The difference involved was stated at the time to be actually as much as that between ten and fifteen francs per ton of actual cargo; and it was only finally settled by the authorisation given to the Khedive by the Sultan to employ military force in order to ensure the passage of ships at the lower rate of charge.

In the present case the amount of the difference in dispute was that beween 118*l.* and 140*l.* per annum, or a little under 20 per cent. The company claimed the right to assess their rates on the total annual sum paid by the lessee of any premises, including rent, rates, and taxes. To be consistent they must have included an extra charge in virtue of the rate levied by themselves. Lord Bramwell, whose clear view of all matters relating to industrial compacts is indisputable, has laid down the rule that the net value, or the letting rent, minus the average cost of repairs, insurance, and other expenses necessary to maintain the house in a state to command that rent, is the sum on which the water companies are allowed to charge. The question is one of the construction of the Act of Parliament. There is no particular reason why a rate should be charged upon net rather than upon gross value, provided that the two parties to the original agreement know which is meant, and act accordingly. A lower charge for the larger value, or a higher charge for the lower value, may come to the same thing. But the gist of the decision now given is, that the company were entitled to a certain rate on the smaller value, and imposed it on the higher. The prohibition of this practice will, no doubt, make a considerable difference to the water-consumers of London. It may, perhaps, lead them to take some steps towards what we have ventured to suggest as the true mode of

solving the water-supply question, the appointment of a committee of water-consumers for mutual defence.

THE ROYAL SOCIETY OF PAINTERS IN WATER COLOURS.

THIS exhibition, which opened this week for its winter season, seems to stand out more than ever conspicuous among the smaller exhibitions for continued and increasing excellence. The present collection is full of fine and interesting work, and we cannot pretend to mention all that is worth looking at. We may allude with regret to the absence of Mr. Alfred Hunt's name from the list of exhibitors, an absence which is understood to arise only from his attention being turned towards other work to be exhibited elsewhere. This serious loss is, however, counterbalanced to some extent by the reappearance on the walls of Mr. Alma Tadema, who has been an absentee for some years. His one contribution, "A Declaration" (349) represents his usual qualities of *technique*, but is unusual in the curious contrast between the two figures seated on the semicircular marble seat, of whom the woman is one of the painter's antique maidens, the man seems rather Mediæval in general appearance and make-up. A fine piece of classicality in some respects is that by Mr. Henry Wallis, which occupies a corresponding central position on another screen, and is called "Pastorale" (402). This is a small and lovely Titianesque study, representing three female figures in warm glowing evening light, the richness of the general colour being further heightened by the silken draperies introduced; the work is a little poem, a specimen of that abstract and truly imaginative painting, of which we see so little now-a-days. Among the specialities of the exhibition are sundry architectural studies by Professor Ruskin, not, we regret to say, coloured ones, but slight pencil sketches on toned paper; slight, but clear and masterly in execution, as everything of this kind is from the hand of one who is in reality the most gifted architectural sketcher and draughtsman of the day, in all the qualities that go to make really first-class architectural sketching. There is a frame of studies of heads, &c., from casts in the British Museum, which are not so gratifying, and indicate where are the limits of Professor Ruskin's powers as a draughtsman. The architectural subjects include the Façade of Bologna Cathedral, and some early Lombard capitals. There are some landscape sketches by the same hand, which are merely memoranda, and if any one else had exhibited them would have incurred the Professor's critical wrath. Similarly *hors ligne* are Mr. Holman Hunt's eccentric studies of landscapes in wool patterns and primary colours, which are all, we observe, bought by some of those who will buy anything which bears the name of a really remarkable painter, who has all but thrown away wonderful powers through some defect of temperament which prevents his work appealing, without grave allowances, to any well-balanced judgment.

Next to Mr. Hunt in absence of all mannerism and conventionality in his art, comes Mr. A. Goodwin, whose works in this exhibition show remarkable power and versatility of style and feeling. His "Trout Stream" (100) is one of the most broadly treated and yet highly finished works in the room; one of those landscapes which are just a degree removed from realism by the effort to blend all the tones of the various parts into a harmony more complete and rounded than is usually found in Nature. But in "Whitby in Sunset Light" (200), the same artist can give us an intense bit of special effect representing quite another phase of landscape-painting; nor would any casual observer take the two works to be by the same hand. Mr. Naftel, whose advance in his art of late years we have before noted, does better than ever in "Gloomy Weather" (155), which is a very powerful mountain scene under a peculiar aspect of light.

The top of the room is occupied in the centre by a large sketch by H.R.H. the Princess Louise, no piece of "royal" work, but a very clever and broadly-treated drawing of Niagara (105), in which the special point is the admirable manner in which the turmoil of the water descending the rapid towards the head of the Fall, and seen in sharp foreshortening, is indicated. The several parts of the scene do not quite coalesce in execution, but of the ability shown in the handling of this part there can be no question; it is far beyond anything that the Princess has exhibited here before, as far as we remember. Mrs. Allingham has been better represented than in this exhibition; but even admitting so much, her works are among the most charming in the collection; they are nearly all on very small scale, and so remarkably finished on that scale; notice "The Granary steps," with the child and the fowls, and the beautiful finish of the birds; and the little figures in the sea-shore scene, "Wet Sands" (347); the individuality of expression imparted to the faces on this very small scale is surprising. Mr. Pilsbury's best work, "Sandhills near Southport" (33), has been hung much too high, perhaps in view of the rather uneventful character of the subject, but it is a masterpiece of tone as affected by sunshine and shadow. Mr. J. D. Watson sends several of those broadly-handled studies of landscapes with figures of which we have seen so many, but which have not ceased to be interesting; the best of this year is perhaps "A Pastoral" (39), which is one of the best, perhaps the best, example in the room of the now often neglected and even despised art of composition in landscape; there is a pleasure in the mere balance of tones and lines and masses in this drawing apart from the sentiment; unless, indeed, it is on that very balance that the sentiment itself in great measure depends: a curious and interesting question in the philosophy of landscape-painting, not to be handled *en passant*, however. "A Stream, Springtime" (225), by the same artist, is another very fine example of the same school of work.

Among realistic drawings of actual scenes none are better than Mr. Gregory's "Rye" (66), a topographical landscape of rare excellence and finish. Mr. Herbert Marshall's London scenes form an interesting contrast to such a work; they are in a sense topographical, but they aim at showing how much of beauty and sentiment can be imparted to a view of an actual scene by treating it under favourable conditions of light and atmosphere, and by a little management of the colour; for in colour Mr. Marshall's scenes are not, it must be confessed, realistic; art has shed a halo over them of her own. In his "Westminster" (88) seen from the opposite bank, Mr. Marshall is at his best this year; his foreground of shipping is admirable, the well-known towers on the other side group finely in the misty atmosphere; the river looks a little too narrow, however. The exhibition, it may be observed, contains a good deal of architectural work; besides several of Mr. Marshall's, there is Mr. Parker's "Mortlake" (85), Miss Montalba's "Old Watch Tower, Amsterdam" (133); Mr. H. P. Riviere's various Roman sketches, of which "The Arch of Septimus Severus" (190) is the best; Mr. Goodwin's "Ponte Vecchio, Florence" (210), a beautiful little drawing; Mr. Hodson's "Abbeville, Afternoon," Mr. North's "Biebrich on the Rhine" (354), an exquisite bit of colour and composition. There are many more interesting works, for the mention of which space and not good-will is wanting.

DWELLINGS FOR THE POOR.

A PROVINCIAL EXPERIENCE.

THE following particulars, kindly furnished to us by Mr. Lawrence Booth, F.R.I.B.A. (Manchester), may be of some value and interest to those who in London are now much taken up with the problem of providing dwellings for the poorest classes on a remunerative commercial basis. The matter is from a paper recently read by Mr. Booth in relation to the new tenements erected under the auspices of the Manchester and Salford Workmen's Dwellings Company (Limited).* The main objects of the company are thus summarised:—

The company has been established to try the experiment of philanthropic motive, combined with a determination to deal with the question on business principles, and to show the possibility of a fair return for capital thus expended; and it is intended to be the nucleus, or at all events the pioneer, of one to be conducted on a much more extended basis. In its present dimensions it is merely experimental, but intended to be demonstrative.

In describing the details of the tenements it is desirable in the first place to make it perfectly clear that the object has been to provide independent household life for the very poor people who now herd together in the slums and low lodging-houses. As the rentals to be charged average only 2s. 6d. per week for one complete tenement, in districts where the price of land is comparatively high, it can hardly be expected that the accommodation should be extensive.

Good sanitary arrangements, privacy, and the possibility of decency in the domestic life of the tenants, are the objects sought to be attained.

The large "flat" system has been avoided, and a plan which may be called that of the "semi-detached cottage" has been adopted.

Blocks, three stories in height, each containing two tenements on the ground-floor, two on the first floor, and two on the top floor, are placed at intervals of about 7 ft. measured along the street frontage.

Between the blocks is an open and uncovered staircase of fireproof construction, giving access right and left to the several dwellings, but preserving at the same time a distinct opening or "cut off" between the several blocks.

The height of the buildings to the "square" or eaves thereof being 28 ft., it is thought that a width of 30 ft. for the front streets is sufficient.

It is intended that such front streets should be used for all necessary vehicular traffic, and that the space usually devoted to back yards, back streets, or back passages, should be utilised for other purposes.

Instead of providing to each house, say 70 superficial feet of back-yard accommodation, duly walled off from a back passage of, say 5 ft. in width, it is intended to give 30 ft. in width between the backs of houses and to leave that space open for playgrounds, drying-grounds, &c.

It is thought that such an arrangement is to be preferred before the ordinary one, because small back-yards attached to dwellings of this kind, and walled off from public observation, obstruct light and air, are seldom kept properly clean, and are a great temptation to the tenant to become dog-fancier, pigeon-keeper, general lumber-storer, or something worse.

Open spaces in the rear thus reserved to the occupants of each group of dwellings will obviate the necessity for children having to play in the public streets.

But combined with the space allowed in the front streets, and the open spaces between the several blocks of tenements, it is intended to provide for such a complete circulation of air around each block as will secure immunity from the spread of fire and even infectious diseases.

Each tenement has its own water-closet and outside coal-bunker, and what is practically its own dust-shoot.

Privacy in these arrangements is thus secured to each family, and tenants will be held individually responsible for their cleanliness in a manner which is impossible when several people have to join in a common use of them.

Wherever the blocks are built on a sufficiently extensive scale, it is intended to utilise the corner sites as small shops and coffee-taverns.

It is not, however, in the opinion of the promoters desirable to build anything like a "colony" of such dwellings in any particular place, but rather to distribute them in smaller groups wherever land can be secured.

The small block system easily adapts itself to any size of plots.

They have fixed the price of one shilling per yard per annum for land as their maximum, and have some difficulty in securing suitable sites at that price.

The internal accommodation provided in each tenement includes a living-room, 12 ft. by 12 ft., and a bedroom, 12 ft. by 10 ft. 6 in. The latter is divided by a wooden partition, about 7 ft. in height, through a portion of its width, thus providing the possibility of a certain degree of privacy in the occupancy of the two beds, &c.

The living-room is fitted with an earthenware slop-sink, with a pantry cupboard over the same, ventilated by the insertion of a grid in the outside wall and small perforations in the cupboard doors, through which fresh air is drawn in and through the cupboard by the action of the kitchen fire.

To economise in cost of construction and to save wall space, the fireplace is set diagonally in one corner of the room. The range provides an oven, a boiler, and open grate, and is constructed with "gills" behind it. These project into a fresh air-chamber formed behind the fire, and thus warm the bedrooms. The air is brought into this chamber directly from the outside in a flue formed in the depth of the floor-joists, and when the warm air is not required in the bedroom it can be shut off by a "hit-and-miss" grid. The cost of a special fireplace for the bedroom is thus saved.

In the opposite corner of the bedroom there is an extraction-flue, carried up with an aperture into it immediately under the ceiling. A constant stream of warmed fresh air can thus flow through the room continuously.

In addition to this, all the window openings are fitted with sashes made to open to their fullest extent, and by opening the inside door, through ventilation between the front and back of each dwelling is secured.

* See illustration in present number.

Water is laid on to each slop-sink, and gas provided in every room. Shelves and hook-rails are provided in each living-room, and strong clothes-hooks on each side of the wooden partition in the bedroom.

The floors of the living-rooms are of concrete, carried on iron joists, and the walls are lined to a height of about 5 ft. with salt glazed bricks, so as to be easily washed and kept clean. The other walls are lined with machine-made common bricks, having a tolerably smooth face, and neatly pointed.

None of the walls are plastered, and there are no skirtings. The bedroom floors are of wood, and the ceilings are lathed and plastered.

All walls and ceilings are lime-whitened only, and no papering is permitted.

All waste-pipes discharge themselves in the open air, and no drain has any connexion with the interior of the buildings.

Before proceeding to give results, it is but justice to the promoters to emphasise the fact that not one of them had any personal or direct interest in the project, beyond a desire to show by example what could be done by judicious investment inspired by philanthropy. Their building operations have not hitherto been on a very extensive scale. Land was difficult to obtain, except at prohibitory prices. At length a small plot was secured in Holt Town, Ancoats, at the price of about 7d. per superficial yard per annum, on a long lease. The plot is somewhat irregular in shape, involving the sacrifice of rather more land than would otherwise be appropriated to playground or drying-ground purposes. The character of the substratum, and the comparative levels of the several streets, were such as to involve increased cost of construction. The price of the land was, however, supposed to be reduced to 7d. per yard in consideration of these defects. Twenty-four ordinary tenements have been erected, and also one corner house of a similar area, but occupying the whole height of the three stories; thus being three times the size of an ordinary dwelling. The cost has been about 78*l.* for each ordinary tenement. This includes architects' commission and every other item of expenditure except that for the paving and flagging of the streets, part of which was already done; the remainder has had to be done at the cost of the company. In their structural and sanitary arrangements the dwellings have fully realised the expectations of the promoters, and they are considered to be well adapted in all respects to their intended purposes. The principal deviation from the original plan has been the substitution, at the request of the Manchester Corporation, of privies, on the "pail system," for the intended water-closets. No gas has been laid on, but in all other respects the buildings have been completed as above described. We have the authority of the architect for saying it may be taken as certain that, with a favourable site, and with the erection of a larger number of tenements included in one building contract, the ascertained cost of 78*l.* would be reduced to 70*l.*

The price per tenement and the burden of ground-rent could also be reduced by carrying up the buildings two or three additional stories in height, for which the "plan" is well suited; but Lancashire people were supposed to have a dislike to climbing up steps into their domiciles. "Experience teaches" applies, however, even in practical Manchester. A difference of 3d. per week per tenement for each story was made in the rentals first demanded, under the impression that a ground-floor tenement would be considered more valuable than one at a higher elevation. It soon became apparent that the increased quietude and privacy, the better light and more fresh air in connexion with those at a higher elevation were regarded as equivalent to the more ready means of access to the ground-floor tenements, and as a result the rents were made uniform at the rate of 2s. 6d. per week.

On the all-important question of judicious and remunerative outlay, the company say that with the proviso of continuous occupation by rent-paying tenants, who would not unduly injure the property beyond ordinary wear and tear, thus obviating the necessity for constant, active, and expensive supervision, and divested of the comparatively large cost of registration, advertising, printing, bookkeeping, &c., incidental to such a small undertaking as theirs, under the Limited Liability Companies Act, a similar scheme, but on a much larger scale, would come very near the realisation of a return equal to 4½ per cent. on the invested capital. It is, however, a perplexing consideration how, when, and where such a combination of favourable conditions can be obtained.

The results at Manchester have hitherto been disappointing in some respects. The position chosen is in the very heart of a poor district, and is surrounded by industrial works of various kinds, employing hundreds of workpeople at low wages. Instead of an anticipated "rush" to secure the chance of decent household life at a cheap price, the tenements, though so few in number, have never all been properly and fully tenanted at one time. And of those who have occupied them a considerable proportion either could not or would not pay their rents. A continual weeding-out has, therefore, been necessary up to this time, although there are reasonable grounds for expecting an improvement in that respect. When ready for occupation the tenements were offered publicly, without any undue restriction, and, in order not to offend the sensibility of any would-be tenant, all mention of such things as charity and philanthrophy was carefully avoided. The only exceptional condition, which was to the effect that every tenant should pay his week's rent in advance, had to be abandoned very soon, upon repeated representations that no such thing had ever been heard of, and that it was simply impossible for very poor working people to meet such an obligation in advance. It is impossible to say whether or not a rigid adherence to the original proviso would have caused the property to remain unoccupied, but it is certain that it would have prevented the incursion of several worthless tenants.

There is in the Manchester district an individual who may be designated the "nomadic householder." He is always on the look-out for newly-built dwellings, and, unless he is practically in collusion with the proprietor, as hereinafter explained, he generally contrives to arrange for a rebate of the first week's rent in consideration of having to clean the new house, &c. Unexpected circumstances prevent his paying the following week's rent, and he goes on till another rent-day before the owner is convinced that his tenant has no intention of paying anything. His scanty collection of household goods is easily removed, and, at or about the end of the fourth week, the landlord is lucky if he gets the key of his own premises, and if the latter be not materially damaged by ill usage or the petty theft of some little movable article such as knobs, taps, latches, hooks, shelving, &c. This type of individual is probably not unknown in other districts, but it is to be feared that he has been very much fostered and encouraged in and around Manchester by speculative builders, in order to enable them to dispose of newly-erected property under apparently favourable conditions of occupancy. Tenements are run up by the score, with no other purpose than that of being sold. The advances from the building society, and the system of credit on which a considerable proportion of the necessary materials and labour have to be provided, combine to strain the financial position at the completion of each building operation, and to make an immediate sale imperative. In order to effect this the houses are painted and papered, or what is,—without the slightest appreciation of the grim irony involved,—called "beautified," long before they are, or could be, even if properly constructed, in a fit condition; and filled with a goodly array of nomadic householders at apparently most remunerative rentals. Then come the placards and the sale by public auction, at which the unwary investor can buy a well-tenanted property, showing a return of about ten per cent.! In the absence of an outside victim, the building society generally exchanges its position of mortgagee for that of owner. Happily such a vicious system is beginning to work its own cure, for notwithstanding the acknowledged want of better housing for the poor there are scores of such "club-built" dwellings in Manchester unoccupied at the present time; and the over-zealous building societies not attempting to "realise" by sale, can only cry "patience, patience," to their disconsolate shareholders.

It is the opinion of men thoroughly acquainted with the circumstances, that the temporary frustration of the well-intentioned efforts of the Manchester and Salford Workmen's Dwellings Company is in no small degree to be attributed to the condition of things we have endeavoured to describe; and that really deserving tenants will, by experience, learn to appreciate the comparative value of that which the company has provided for them. In the absence of such appreciation, the prospect is instead a dark one for the very poor householders in that district; because nothing but absolute and deliberate charity, which in such a case is only another name for pauper relief, or the inside of the workhouse, can afford them an equal chance of bettering their present lamentable condition of herding together under influences that are a disgrace to our common humanity and to the vaunted civilisation of a Christian country. The company having carried out its own part of its philanthropic purpose amid a great deal of head-shaking, it is tolerably certain that unless those intended to be benefited evince a warmer appreciation of its efforts, no other attempt of a similar character is likely to be made,—at all events, under the difficulties which at present environ the subject.

We may point out how decidedly some of the experience here detailed bears out the scope of our own remarks a few weeks ago,* in regard to some of the probable results of furnishing dwellings for the poorest class, without personal supervision and enforced regularity of payment. The condition of rent in advance seems hard, but it might have been the kinder policy, as well as the more paying one in the long run, to have enforced it.

ANGLO-SAXON ANTIQUITIES.

THE following is a *résumé* of the first three of Professor Hodgetts's lectures before referred to, and which are now in progress in the Anglo-Saxon Room at the British Museum, on Wednesdays, up to the 19th inst.:—

Our own archæological remains and antiquarian relics are much more calculated to interest our minds, and ought to be much nearer our hearts, than the historic remnants left us by a foreign enemy whose mode of thought was on almost every possible point at variance with our own. And yet to the teachings of that foreign foe are we referred whenever we seek for truth. Not very long ago, English was taught in no public school whatever; it was thought *infra dignitate* to study English, and we were bred as though to become Greeks and Romans, while in the remains around us we have classic ground as yet untrod. We are by the very circumstance of the relics preserved in the British Museum brought, as it were, face to face with those pioneers of our race who won for us this fair island of which we are so justly proud by the grand old weapon, the sword, lying mouldering before us. We see that, like ourselves, it is not Roman, but of a totally different type from the *gladius*. The blade is totally different from that of the Roman warrior, and the word "blade" is not Latin, but refers us at once to Teutonic vocabularies, where we find *Blatt* in German, *Blæd* in Icelandic, *Blad* in Swedish, all meaning "a leaf," and more emphatically, perhaps, the leaf of the long sword-like grass which grows so luxuriantly on the banks of the lakes and meres of the North. The *gladius* is referred in the same way to the leaf of the gladiolus, which it resembles, but the small blade of the Greek or Roman warrior could stand no chance against the terrible arm before us. Our blade, then, is, by the side-light of philology, a Scandinavian word; and what of the objects to which that word applies? Let us look about us in Scandinavia, and in the grave-hills of the Vikings we find this blade,—at least, a blade as like it as two blades would be in one regiment.

The inhabitants found in Britain by the Romans adopted Roman arms and armour, Roman habits, and Roman laws, while the manners, thoughts, and customs of the Scandinavians remained perfectly Scandinavian in Romanised Britain just as they do in Anglicised America, New Zealand, or Australia. The Britons were a sort of feeble imitation of the Romans, and what chance had they against Rome's conquerors? As much as the "gladius" against the "blade." Without much book-learning an intelligent observer might deduce the following facts:—First, that a race had existed in Britain which had not been very warlike, in that it copied the Roman sword in a metal more easy to work in than iron or steel. Secondly, that this bronze-gladius-people were defeated by a big steel-sword-race, who took possession of the land and buried their dead. The bronze gladius is found in rivers, showing that the

* See leading article, Nov. 3, p. 577, *ante*.

owners had been driven into the water, where they perished, leaving only the indestructible metal to tell the tale.

Wherever Scandinavians conquered they left big swords, chain armour, and the circular target. The big blade was copied by the Gael as the gladius had been by the Kelt, and in the word claymore (*glaive-more*) which only means big blade, we get their version of the "Hring Mœl" or Ring Hewer, because it clove the rings of the mail in twain, or, as some suppose, because it was ornamented with gifts of golden rings.

The shape of this sword remained unaltered all through the "North." It was the blade of the early Viking, and we find it down to the Norman time on all the monuments remaining to us without change. The Normans, unlike the Saxons, had been untrue to ancient Scandinavian tradition, in relinquishing the speech of their fathers and adopting a modification of the Roman tongue, and they modified the ancient sword, lengthening it and giving it a cross-guard, and this, with the Crusaders, bore fully as mysterious a meaning as the old pagan form had done. The point could be stuck in the earth and invoked as a cross. When the Norman spark had glowed its last, we find the sword returning to its pristine form, and Norman French dying out.

There was a shorter sword or knife worn chiefly in a girdle; this was called the *seax*, a term applied to scissors all through Scandinavia now. This *seax* has played its part in English history, and there are some who hold that the name of this curved weapon gave the title to our race in so far as we claim the Saxon part of our addition for our own. This knife was not necessarily a warlike badge, being used, like the dagger in Hudibras, for peace or war. Its chief use in war was to despatch a warrior whose chain-mail armour had been cut through by the ring-hewer, but whose life was not yet sped. Its use in this respect resembles that of the *misericorde* of later times, which was a direct descendant of the more ancient *seax*.

If we regard the sword as it lies in its glass tomb before us, we shall see a form of hilt reminding us immediately of Asiatic types. The ball at the top of the grip is partly to keep the weapon from slipping out of the hand, as is the case in all Indian swords. The hilt is very small and not adapted to save the hand from a gliding blow descending down the blade. These small projections are to prevent the sword from slipping quite through the slit in the Byrnie (the true Saxon English word for coat of mail), in which it was worn naked in war.

The pieces of gold or silver which were added to the blade were made to bear certain signs which are now most unfamiliar to our eyes. They are the ancient runes, or mystic letters of the gods, said to have been invented by Odin, and to partake, like the Devanagari of India, of divine attributes. The names given to their swords by our forefathers were inscribed in runic characters, because it was thought they thereby gained some greater power both in attack and defence. There were forty characters among the Anglo-Saxon runes, and these expressed all the sounds of our language which the meagre Latin alphabet which we have adopted does not. We have five different sounds for which A must stand. O also does duty for the same number.

Our ancient runes had occult meaning besides the literal power for which they stood. Thus the rune Tyr, meant T when in combination with other letters spelling a word. Alone it represented the god Tyr, Ty, Tys, or Tius (evidently a form of Sanskrit *Djaus*, Greek Θεος, Latin *Deus*), a young warrior, or a javelin. This alone is a strong proof of the highly abstract powers of reasoning possessed by these ancient warriors. The word for spear or javelin is *gár*, but the rune does not stand for G but for T, because the *gár* is the attribute of Tyr, for whom the rune is supposed to stand. This is not the result of savage ingenuity, but of abstract thought.

The proofs existing in various MSS. all through the North show us that the Scandinavians wore chain mail armour, or armour of rings linked together so as to form an iron net. Sir Samuel Meyrick, misled by the sound, has taken the words "Hring Mœl" to mean the armour, whereas it really denotes the weapon, so called in contradistinction from the smaller "seax."

The word "sweord" (German, *schwerdt*; Scandinavian, *svärt*) is full of curious hidden teaching, and is cognate with the verb "to swear," oaths being formally taken on the sword as the most holy thing upon which a vow could be taken. And it brings us into tales and myths of a very far back past indeed,—to the cradle-time of our race in India; for the root "swer" brings us face to face with "shining light," of which the "swerga" is also composed. The root "swar" indicates the meaning sound (as in our "answer"; Swedish, *svar*; German, *antwort*); so that it is either the flash or the ringing song, or both; for who shall say which is the first when a sword leaps from the scabbard, the flash or the sound?

Passing, in the second lecture, from the sword to the shield, Professor Hodgetts first called attention to the boss of the shield, which is nearly all that is preserved to us; but this portion, being of burnished bronze or bright steel, was the object of the warrior's special care, and has come down to us, while the linden wood of the other portion has become the prey of time. Below, at the base of the boss, was a transverse bar by which the shield was held in the left hand, not as the Romans held their shields, by means of two leathern holders fastened on to the back of the shield, through one of which the arm was thrust while the hand grasped the second. The wood used to form the body of this defensive arm was that of the linden-tree, and so identified was the idea of shield with that of the linden that the name of the wood is used all through Scandinavian poetry to denote the shield, which however, is also frequently called the "board." The concentric rings which we find mentioned were probably of gold, but there seem no traces of them in the grave mounds, although the boss is constantly occurring. They may, therefore, have been painted. There can be no doubt that some distinction was marked on the shield by which the warrior could be recognised by his friends. The young untried warriors wore white shields. Tacitus remarks on the immense preponderance of white shields among the Germans over those bearing some colour or other distinctive marks. The colours of the furs of certain animals would naturally afford a ready means of distinguishing the bearer. The white colour was probably due, as in Russia, to the undressed bide of the animal, or rather the under-skin (not the fur side), being stretched over the wood, and either painted white or bleached. The form of the Saxon shield, like that of the Saxon sword, lives yet in the target and claymore of the Gael.

The fact of a white shield denoting an untried warrior, or one who had not earned the badge of special distinction, is itself heraldry, and, whatever the system may in its infancy have been, there was certainly the fact of the identification of the warrior in some way or other with his arms. They were hung up behind his place in the hall in a group, and thus were over his head in sleeping. This is to be seen in the House of Lords in England and the House of Knights at Riga. Some kind of distinction besides the painted or gilt rings was, in all probability, worn; but the custom of putting metals on furs or colours, and not on metals,—a rule observed in modern heraldry,—clearly dates from the ancient Viking shield.

As the place in the hall occupied by the warrior was thus marked by his shield, so on board the Viking ship the buckler held its own, and this in a more emphatic way still, for all round the ship's side the linden-boards were hung so that the gunwale supporting them became known also as the "board." Hence to *board* a ship is to cross the gunwale. The *starboard* is that part of the gunwale to which the "styr-rudir" was fixed, always on the right-hand side, and the other part was called the "back-board, *i.e.* not the front, as it is still called in German and Swedish.

At the great meetings called the *tings* of the North the shield played a very important part. It was the means, with the sword, of expressing assent or applause when any question was ventilated. The warriors stood round their king, who stood upon a grave-mound or doom-stone, his yarls and thanes forming a ring of nobles round him. Outside this ring came the free land-owners, not nobles, and outside them, again, the peasants. When applause was to be expressed, the sword, worn in the scabbard at such meetings, was drawn and clashed against the shield. Dissent and dislike were expressed by ominous silence.

Notwithstanding the efforts of the Latinists the "scutum" has not driven the shield out of our language, nor has the tyrant Rome been able to disarm us of our sword, and give us a *gladius* or an *enser* instead. The word "shield" is still a tower of strength, a "shield-burg" (Icelandic, "skiöldborg"; German, "schildburg").

The form of the shield has become modified in various ages in England; and the last forms used,—the buckler of Elizabeth's time, and the more recent Highland target,—were returns to the early shape. Besides the circular shield there seems to have been a heavier arm of an oval shape, or else in the form of a parallelogram. This was called the "scild-truma," or troop-shield, and could be used as a rampart to protect the combatants; and these were carried by the thralls or slaves.

The employment of the shield in mythology has given rise to many very beautiful ideas. For example, the sun, although the attribute of the sun-god Baldur, is still regarded as Odin's shield when Wisdom defends Love. The moon is the white shield of the young warrior. The shield meant the sun, the moon, and, finally, such forms of truth as might be assailed but not destroyed by man. Such was the early belief of our own race; but we came to a land of fogs where we seldom see the sun, and hardly ever the moon.

From the dislike entertained by our forefathers of fenced cities came much of the destruction of Roman fortification. The Scandinavian admitted no tower of strength, and his only fence was his shield. Our wooden walls have passed away from the ocean; our ships wear armour on the waves, and the light linden shields have given way to immense masses of steel and iron repelling, not the "snowstorm of white-feathered arrows," but a hail of devastating shot of which no Viking ever formed a thought.

Taking up, in his third lecture, the subject of the spear, javelin, and arrow, Professor Hodgetts showed how the javelin had become incorporated into the name of the warrior in the expression "Gár-Dene," *i.e.*, spear-danes, a compound like our horseman, footman, swordsman, and the like. Dane was taken as a generic name for all Scandinavians, and hence included the Angles. It was shown that the term "gar" was originally generic, while the terms "speer," "spit," "spiess," "spjöt" were applied to specific forms. Subsequently, however, the expression "gár" seems to have been applied to the barbed form of the head, and the word "spear" to the leaf-like shape more familiar to us. As, in the lecture on the sword, the leaf was referred to as affording a clue to name and form, so in the spear it was shown that this name was either derived from the halm of straw, called *sper* in Old High German; or the halm of straw was so called from its resemblance to the weapon. In the same way the word "strœl" for arrow was cognate with "strœ," "straw," and from this, again, with the German *strahl*, Swedish *sträl*, a sun-beam. The word "beam" was shown to be cognate with the German *baum*, a tree, and to mean a spear-shaft, inasmuch as this was the noblest use to which a tree could be put. The word "lance" was shown to be a corruption of the Teutonic *land*, the word for "lance" having been originally the *landes-knechen-spies*, the spear of the servant of his country, corrupted into *landes-spies*, *lans-spies*, and *lans*, in which form it exists in Denmark. The word "*lancea*" is a foreign word in Latin, introduced (it is said) from Spain in the third century.

Connected with the spear is the beam, the shaft, the wood of the ash-tree, which gave occasion for a very full account of the myth of Odin's tree, the worship of which was celebrated on Wodens-day, thence called Ash Wednesday. The whole myth is much too long for insertion here, we can only notice its interest in that it presents to us in a very powerful manner a very full view of the belief entertained by our fathers of the way in which the Cosmos is represented by a tree, and also by a man. Another myth, that of Baldur's death by the misteltoe arrow, was cited in connexion with the history of English thought in relation to the arrow. The use of the arrow in war was shown from passages in Anglo-Saxon and other Scandinavian sources.

Mr. Hodgetts quoted from a learned Danish work on "Thor og hans hammer," the opinion that the stone weapons found in the grave-hills of our warriors were *simulacra armorum*, meant to typify the power of Thor over the elves and spirits of darkness, and made in stone; first,

because steel had no power over elves, and, secondly, because flint was not liable to rust. He referred to a splendid exhibition of arrow-heads at the British Archæological Society on the 21st inst., by Mr. Borlase, M.P., the forms of which were precisely similar to those found in Scandinavian graves. In the North the arrow-head, the axe, and the mallet, are all found in stone, and all attributed to Thor.

The lecturer then gave a brief sketch of the history of the bow in England, of the reason for its increase in strength and length, and of its good service in ridding the land of the Normans, the weapon being to the Middle Ages what the rifle is to us.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

At the third ordinary meeting of this Institute for session 1883-84, held on Monday evening last, Mr. David Brandon, vice-president, in the chair, the Secretary announced that Professor Roger Smith, who was to have opened the discussion on Mr. Robins's paper on "The Fittings of Buildings for Applied Science Construction," * was unfortunately kept at home by illness. Mr. Robins, therefore, continued his paper, the reading of which, with its appendices, was not completed at the last meeting.

Mr. Robins made a few prefatory remarks as to the death of Sir William Siemens, which occurred on the very evening of their last meeting. By his death the scientific world had sustained a very great loss. It would perhaps be remembered that on the occasion when he (Mr. Robins) read his first paper,† Sir William Siemens was present and took part in the discussion, having also very kindly discussed with the author many of the details which were included in the present paper. Turning to the immediate subject in hand, Mr. Robins gave a brief description of the fittings suited for the mechanical departments of technical colleges, observing that a detailed description was not necessary, nor could it be complete, because the system of instruction was not at present fully developed, and it varied in different colleges. Referring to the special means necessary for the ventilation of laboratories, Mr. Robins said:—

Perhaps, as the extraction of the vitiated air generated in laboratories is so closely allied to my subject of fittings, I may be allowed to say a few words upon it, even if I seem to combat the opinion of Sir Frederick Bramwell that architects as a rule think more of taking out the bad air than of supplying fresh air abundantly, delivered without draught. He knows better of some of us than that, and his approval of my scheme for ventilating the rooms of the Society of Arts, which includes both the admission of fresh air (warm or cold) as well as the extraction of the foul air, both in winter and in summer, by a heated vitiated air-shaft, has been justified by its success, for which I have received a vote of thanks from the Council, of which body the late Sir William Siemens was chairman. In applied science buildings we have not only to deal with close atmosphere arising from the congregation of many persons in one room at one time, and for a long time together, but we have also to contend with the obnoxious smells which are made by the experiments carried on in the various laboratories. The removal of these fumes with the greatest rapidity and certainty is best accomplished where the current of air in the extracting-shafts of the ordinary room ventilation is in the same direction as that of the draught-closets on the benches or around the walls. This is so obvious when thus plainly put that it will hardly be credited that in the majority of cases the reverse is the practical fact, thus necessitating the closing of the extract-gratings for the ordinary room ventilation that they may not pull against the extracts from the operating-benches and draught-closets. The velocity at which the extraction of air should take place in the draught-closets is not less than 5 ft. per second. To ensure this draught at a constant velocity it is necessary to be independent of casual winds and changing temperature as a means of motion. This requires the employment of certain apparatus to produce either a propelling or a sucking force, of which the latter is usually either a common upcast shaft, heated at its base by a furnace or the product of furnaces, attached to engines or heating apparatus. Neither of these, however, can be depended on for constancy, and, therefore, the best agency is a fan, the rotation of which, propelled by a steam, gas, or electric engine, where water-power is not available, steadily exhausts the air from the air channels, and establishes an upward and outward current in the shaft from the point at which it debouches. The position in which this extract-fan is placed in the shaft determines whether the vertical warm-air channels shall have an ascending or descending current established within them before reaching the shaft. If placed below the basement and at the foot of the shaft, the current will be descending; if placed at the roof level, the current will be ascending, to communicate in each case with horizontal channels graduated in size till they reach the spot where the fan is situated. In many cases on the Continent there are fans both above and below, as at Geneva, in others above for the draught-closets only and a furnace below for the room ventilation. This is the case at Munich, for example, with the result I have already mentioned, but I should explain that fresh air is separately admitted to the draught-closets as well as the room, and it was thought that this would overcome the difficulty, but it does not in practice, and we should take warning. Of course it is apparent that the extraction of so much bad air must be replaced by a corresponding amount of fresh air, warmed on its entrance in winter, and cold in summer. The only way I know of to prevent cross draughts is to introduce this fresh air with an upward current through vertical shafts, or openings not fixed in the face of the side walls; then, whether you force the air in by fans or leave it to come in as it is drawn, its tendency is to rise before mingling with the air of the room. I am so arranging it at Bristol, and it is so introduced at Dundee. In summer the room openings for the escape of the foul air may be at the top of the opposite wall, but in winter, if they are not also provided at the bottom of the room, so that the upper can be closed, the warm air will be carried away before warming the room; in either case the air will be pure, because it will never have time to get stagnant, but will always be changing as many times in the hour as may be predetermined. The usual temperature required to be maintained in class-rooms is 60° Fahrenheit, when the external temperature is as low as 25°, and 55° in the staircases and corridors. The change of air to be effected by ventilation should be 700 cubic feet per person per hour in the class-rooms, and 3,000 cubic feet for the chemical laboratories. At the University College, Dundee, the air is forced in by five air-pumps, but it is not drawn out by mechanical means, and the air of the laboratory is changed three times in the hour. [It should be added to this that in the course of his paper Mr. Robins referred in detail to arrangements for heating several of these important buildings, the work having been done by Messrs. Bacon & Co., with very great credit to themselves.]

Professor Armstrong, who was invited by the chairman to open the discussion, gave an account of some experiments which had recently been made with the object of testing the proposed arrangements for securing ventilation. They had, in the first instance, an up-cast shaft 3 ft. square and 120 ft. high, with an internal smoke-flue, of iron, 18 in. in diameter and ¾ in. thick; and communicating with the laboratory on the second floor was a down-cast shaft 47 ft. deep, which entered the up-cast shaft at the base. All the horizontal or floor flues communicated with the up-cast shaft, and the draught passed down and then up through the outer jacket. It was assumed that the heat given from the furnaces and the boiler would suffice to produce the necessary velocity in these flues, and in order to be able to produce the necessary velocity when the furnaces and boilers were not in action a pilot furnace was constructed in the basement. The experimenting party found, however, that the heat they got into the chimney did not suffice, and in order to give some idea of what they were doing, a somewhat exhaustive series of experiments had lately been made, which were tabulated. Members interested enough in these figures could carefully examine them for themselves afterwards. He would just quote a few of them. A series of experiments was begun on the 21st of the month, when the wind was very high; there had been no fires for three days before the fan was stopped, and they found that even under these circumstances there was a very considerable velocity at the head of the up-cast of 3 ft. or 4 ft. per second, produced entirely by the wind blowing across the head of the shaft. The wind was blowing on the south face of the building, and opening the windows on that side produced a considerable addition to the velocity, the velocity rising from 4 ft. per second to 6 ft. Opening the windows on the north face had no such effect. To test the effect of putting on more heat, the Professor said he introduced a large ring gas-burner into the shaft with 118 holes, capable of burning 450 ft. of gas per hour. When this burner was lighted, it was found that there was an increased velocity of 4 ft. per second from burning this gas in the outer shaft. Next day experiments were made to determine the velocity when the fires were lighted in the furnaces, and it was found that the velocity, with the fan running at half speed, never rose above 5 ft. per second. When the gas was lighted in the outer ring it rose to 8½ ft. per second; and again nearly 4 ft. per second was got by burning gas in the outer shaft. Other experiments of a like nature were referred to. A further series of experiments followed, the velocity being worked to 10 ft. per second at the head of the down-cast shaft to determine what velocity could be got at the flue openings on the benches. The result was that when everything was in action as it should be in ordinary work a velocity of barely 1 ft. per second was got at the orifices on or near the benches, so that it was quite clear that with the proposed arrangement for ventilation it was impossible to reach the desired end. Hence it was decided to try the fan experiment. The testing process was somewhat interesting, as showing what can be done now-a-days. The laboratory was on the second floor, and all the motive power in the basement. Of course it was not an easy thing to fix a steam engine on the second floor of a building, but one of the electro-motors had been placed at the disposal of the experimentors, and a 2-ft. Blackman fan was fitted at the head of the down-cast shaft. That fan was not fitted until Saturday last, and it was only on Monday morning that the electro-motor was set going. He was glad to say that with the aid of this fan it was proved conclusively that the ideas he and his friends had all along entertained as to the true system of ventilation were really practicable. They found they could get the necessary velocity, and that having got the velocity their former experiments had shown to be indispensable, they reached the desired end. With everything open and the chimney at work, they got a velocity of barely 1 ft. a second; with the fan running 510 revolutions a minute, they got 3 ft. per second, with the fan running 666 revolutions, 3½ ft., and with 800 revolutions, 4·1 ft., whilst when running the fan up to 900 revolutions a minute, it rose to 4·9 ft. per second. This was with a fan of 2 ft. diameter only, and worked by an electro-motor small enough to be easily carried upstairs by one man, the electric current being led up from the basement with a wire of but a ¼ in. in diameter. This was an interesting experiment in the use of electro-motors for such purposes apart from the results obtained.

Mr. W. W. Phipson said the ventilation of the Bute Hall of the Glasgow University was carried out on a principle somewhat like that adopted at the Institution of Civil Engineers. The speaker further described how he had solved the difficult problem of laboratory ventilation at the new Medical Schools at Edinburgh, where he got a velocity of as much as 8, 9, and 13 ft. per second. He expressed his conviction that if the draught were less than 6 ft. to 8 ft. in horizontal draught flues, the chemical fumes would not be removed sufficiently for the requirements of the professors.

Professor Perry did not know that he had much to say on the subject of ventilation, but he should like to observe that the velocity with which the air was passing through an orifice, or moved in a certain neighbourhood, really gave us very little information as to the amount of draught in the neighbourhood. Of course, when the orifice through which air was made to pass in given quantities was small the velocity would be greater than when the same quantities of air were forced through larger orifices. He thought that the experiments of that afternoon had shown that a velocity of 3 ft. 6 in. or 4 ft. per second at the orifice was quite sufficient to pro-

* See p. 680, *ante*.

† "On the Special Buildings for Applied Science and Art Instruction." See *Builder*, vol. xliv., p. 171.

duce a very considerable clearance of the fumes. Professor Ayrton about a year ago brought before the Institute some calculations, and asserted that ventilation by the aid of the waste-heat of a furnace could not be anything like as efficient as ventilation by fans, even taking into account the want of efficient steam-engines to drive the fans. Professor Perry said he found it remarked in the paper to which he alluded that his colleague and himself thought the ventilation of the future would be performed by electro-motors driving fans. He hoped Dr. Armstrong's experiments that day, —almost the first, he believed, made in an actual building to test the efficiency of an electro-motor driving a fan,—would force on the attention of architects what had been done at the Finsbury College. With regard to mechanical laboratories, he understood that Mr. Robins expected a few remarks from himself. He would speak of the mechanical laboratory of the future only. That of the past had been a professor's private room, in which he made his own experiments, unassisted, as a rule, even by his one or two senior students, of whom Mr. Robins talked. There the professor worked out his own researches, embodying the results in papers to be read before the Institutions of Civil or Mechanical Engineers. Doubtless valuable information with regard to the strength of materials and their behaviour under different circumstances had thus been harvested. But there could be no question as to the change that had come over, not merely chemistry, but over mechanical science also, during the last twenty or twenty-five years; and architects, like other people, must open their eyes to the facts. An idea was now afloat, was working itself out, and taking definite shape, that laboratory work in mechanical science is a necessity in our schools and colleges, and it was necessary that a mechanical laboratory should be of sufficient size and properly fitted. In conclusion, Professor Perry described a simple means (devised by Professor James Thomson) of hanging large blackboards for mathematical and other demonstrations, so that a large board could be easily moved by a slight touch.

Mr. Hugh McLachlan, Associate, and holder of the Godwin Bursary for the current year, then gave a short description, in response to an invitation made to him, of the fittings of some laboratories he had recently visited while on his recent tour (as holder of the Bursary) in North Germany.

The chairman having made a few observations, Mr. Robins replied, and the meeting adjourned.

DISEASES CAUSED BY SANITARY DEFECTS IN HOUSES.

THIS was the subject of a lecture delivered at the Parkes Museum on the 29th ult. by Dr. Charles Kelly, Professor of Hygiene in King's College. Professor de Chaumont occupied the chair. The lecturer observed that the examples of defects and of the evils to which they gave rise had been taken from a healthy *country* district, because the conditions for investigating diseases are much simpler in places which are small and isolated than in large towns, where the difficulty is sometimes very great. This country district, with a population of 100,000, has now a general death-rate of from 14 to 15 per 1,000, and a zymotic death-rate of 1·2 per 1,000, or 120 yearly. The lecturer traced outbreaks of the various zymotic diseases that had occurred during the last few years, and showed that although many of them were due to the milk or water supply, some could undoubtedly be traced to sewer-gas which found its way into houses where the sewers were unventilated; and even in some cases the ventilation of sewers had proved the cause of evil by the sewer gas escaping from the street ventilators, especially where the outfall of the sewer was tide-locked. This was shown by outbreaks occurring directly a new system of ventilated sewers had been laid down, in a place where they had previously been without either regular house-drains or sewers. Diphtheria is a disease which seems to be in some cases due to sewer gas, but there is little doubt that cold and damp are its predisposing causes in many cases, if not its origin. Besides the more severe forms of disease traceable, there are other disorders which make little or no impression upon the death-rate, but yet which must affect the general health. Persons exposed to sewer gas in a dilute form are pale and anæmic; they often suffer from headache, sore throats, and from diarrhœa; the appetite is impaired, and they fall into a feeble state of health. Women and children are more liable than men, because they live more at home and are, therefore, more exposed. To prevent the occurrence of those diseases of which enteric fever may be taken as the type, it is essential:—(1.) That the drinking water shall be pure; (2.) That no sewer gas shall enter the dwelling. It has been shown that water, though delivered pure by a company, may become polluted in various ways after it has entered a dwelling. To prevent such pollution regulations are now laid down by most companies. If the constant system is in use all the drinking-water should be drawn from a tap direct from the main. If the intermittent system is in use there should be a separate cistern for drinking-water, and this should have no connexion with any drains whatever. An overflow or waste pipe should not be attached to any cistern, but, as a precaution against overfilling, a tell-tale or warning-pipe should be fixed so as to discharge in some conspicuous place in the open air. Every closet supplied with water should only be so supplied by means of a cistern by which about two gallons of water can flow at each discharge. The supply-pipe should not be less than 1¼ in. in diameter, so that the water may descend as rapidly and in as straight a line as possible. To prevent the entrance of sewer gas into houses, it is needful that all sink and bath pipes shall deliver into the open air outside the dwelling. Their course should be as short as possible, and in many cases the pipe would only have to pass through the wall sink or bath. The contents would then pass into a trap or gully about 1 ft. 6 in. distant from the house wall, so that if any gas happened to be forced through the trap, it would pass into the atmosphere, and not into the house. The soil-pipe should be outside the house, and from its upper end there should be a ventilating-pipe carried up above the eaves of the dwellings. Some recommend that between the house-drain and the main sewer there should be an intercepting trap, so as to prevent the foul air from public sewers from making its way into house-drains. Two untrapped openings are made in the drains, so as to provide for a free circulation of air. In the Model By-laws two methods are given for ventilation of house-drains, but in all cases a trap is placed between the house and the sewer. The lecturer was not sure that this plan is a good one. It makes no provision for the ventilation of the main sewer other than by openings at the street levels, and many complaints arise from this cause. There is no power to erect ventilating-shafts by the side of houses without the leave of the owners, and such leave is not often given. In seaside towns, where the sewer is tide-locked twice a day, or in places where the sewer is laid nearly level, the means of ventilation by openings in the road is not sufficient. In some towns where these ventilators are very offensive, enteric fever has been on the increase during the last two or three years. In many cases the best plan is to let every house-drain be directly connected with the sewer, and to do away with any disconnecting chamber or trap. Every soil-pipe being carried up above the house in its full diameter will then act as a ventilator to the main sewer. In a street half a mile long with houses on each side there might thus be as many as 150 or 200 ventilators instead of only having eight or nine on the road level. Sewer-gas is often less injurious than the air which is met with in the house-drains, if they are not well flushed. All liquid and solid refuse should be conveyed as rapidly as possible from the house to some distant point where it can be dealt with. Any traps or contrivances which hinder this flow are not to be commended. The best way to prevent sewer-gas becoming dangerous is to allow as much circulation of air as possible in the sewer, and this can only be done by making the openings as numerous as possible. When drains and sewers first became known, it seems to have been the practice to hide everything away out of sight, and to bring the drains inside the house at several points. Much of the work in the present day consists in undoing the work of the past. That house can alone be considered fit to live in which, within its four walls or beneath its basement, contains no drains whatever. There are few places more healthy than a coastguard station, at some of which there are no sanitary defects whatever, and where cleanliness is strictly observed. In many a village enteric fever is unknown, unless it happens to be imported. But in houses where the arrangements are very complex, it is frequently met with. In most places it is far healthier to live in a clean well-built cottage with no drains whatever, than in more pretentious dwellings, where the drains are too often defective. In the simplicity of their dwellings the poor enjoy an immunity often denied to the rich.

In the course of the discussion which followed,

Mr. Hazard strongly condemned the practice now recommended and carried out by sanitary engineers of disconnecting house-drains from the sewers, and carrying up a ventilating-pipe to ventilate only the drains of one house. He contended that every house should be provided with a ventilating-pipe, and that every ventilating-pipe carried up should be made to work for the common good. The present method of procedure was selfish in the extreme. A man who carried up a ventilating-pipe did not care who got the sewer-gas so long as *he* did not.

Mr. Mark H. Judge thought that the lecturer's remarks as to the inutility or harmfulness of disconnexion were to be received with very considerable caution. Disconnexion of the sewers and house-drains was imperatively necessary so long as sewers were imperfectly constructed and inadequately ventilated. He thought Mr. Hazard's remarks as to community of ventilating-pipes must also be received with caution, for great dangers to the public were conceivable under such a system.

Dr. Poore observed that the remarks of the previous speakers had opened up a very interesting question, viz., the moral responsibility of individuals in respect of sanitary matters. People, in large towns especially, were so apt to rely on the public authorities for the performance of sanitary work that they seldom considered what they might do individually. Individuals might do much useful sanitary work for their own benefit as well as to the public advantage if they would only take the trouble to understand what was required to be done. One of the instances cited by Professor Kelly seemed to show that a system of sewerage was not always and everywhere essential. Every house that had its quarter of an acre of garden-ground could innocuously dispose of its own refuse. That being the case, what a scandal it was to see, between Isleworth and Hounslow, an open sewer, charged with the filth from villa residences in the neighbourhood, flowing through thousands of acres of market-gardens, upon the surface of which its contents might be easily and profitably utilised, and a serious nuisance avoided.

Mr. Rogers Field expressed his regret that many people of education and wealth, owning country seats, should get rid of the sewage of their mansions by discharging it into pits or cesspools in porous strata. It was a cheap and speedy method of disposing of their sewage, but ought they to be allowed to resort to it? The sewage disappeared, but where did it go to or what source of water supply might it not be polluting? Clearly their sense of moral responsibility for sanitary work was not very acute.

Dr. Steele proposed and Mr. Ernest Turner seconded a vote of thanks to the lecturer, which, having been put to the meeting, was cordially agreed to, and the lecturer having said a few words in reply, the meeting terminated.

SANITARY INSPECTORS AND THEIR TENURE OF OFFICE.

THIS was the subject of a paper read by Mr. E. S. May, of Ramsgate, on Saturday evening last before the members of the Association of Public Sanitary Inspectors, who met in the Library of the Social Science Association, Adam-street, Adelphi, Mr. G. B. Jerram in the chair.

Mr. May, in commencing his paper, said it would be unnecessary to refer in detail to the various Acts of Parliament and Orders relating to the appointment of inspectors of nuisances, as their provisions were well known to most officers. He proposed, however, to refer to their tenure of office, and to show in what manner such officers were affected by the General Orders issued by the Local Government Board, dated March 10 and 13, 1880. Article 9 of the Order of March 10 referred to urban inspectors, and provided that—

"Every officer shall continue to hold office for such period as the Sanitary Authority may, with

he approval of the Local Government Board, determine, or until he die or resign, or be removed by such Authority with the assent of the Local Government Board), or by the Local Government Board," &c.

The fourth clause of Article 6 provided that—

"In the case of any officer who holds his office for a specified term, the Sanitary Authority may provide for the continuance of such officer, or appoint his successor within three calendar months next before the expiration of such term."

Thus the Sanitary Authorities might appoint other persons to take the places of existing officers before their term of office expired. This was virtually giving the local authorities the power to do as they liked with their officers, good, bad, or indifferent. The consequence was that an officer after receiving an appointment frequently found himself completely in the power of the Authority, or at least in that of some of its members. The results were seriously detrimental, not only to the officers themselves, but to the public. It was sincerely to be hoped that at no distant date a reformation in the mode of appointment of all sanitary officers would be effected. Registrars of births, deaths, and marriages, relieving officers, school-attendance and inquiry officers, vaccination officers, and many others, all held permanent appointments. Why should a distinction or exception be made in the case of sanitary officers, whose duties were far more onerous and unpleasant than those of any of the officers just named? Why should the sanitary inspector, while endeavouring fearlessly and faithfully to discharge the duties of his office, be worried with anxiety lest, at the expiration of his term of office, he might not be re-appointed? Why should such officers be discouraged by being made to feel that their services were unrecognised,—that no matter how much they gained in experience, no matter how efficient they became for the performance of their duties, they were apt to lose their appointments at the caprice of their employers, to some of whom they might have made themselves offensive by the impartial discharge of their duties? It might be said that a good officer need be under no fear as to his re-appointment at the end of each term. That might apply to some Authorities, who, acting conscientiously, were desirous of retaining the services of a good officer, but there were many exceptions to that state of things, and good officers were often superseded for no just cause. The foregoing observations applied more particularly to provincial Authorities; for, in the metropolis, the officers, with few exceptions, were appointed permanently, and they were consequently more free to discharge their duties fearlessly and independently. In support of the author's proposition that the tenure of office of sanitary inspectors should be placed on a securer basis than at present, he urged the following arguments:—A sanitary officer, in the discharge of his duty, is, unlike the soldier, always in battle. The enemy he is seeking to destroy is unseen, yet it lurks insidiously at every turn. He is consequently continually exposed to far greater dangers than the soldier, while he has no compensating advantages in the shape of foreign travel. The soldier, if he escapes the bullets and bayonets of a military foe, returns home honoured to a life of comparative ease, with a prospect of a pension. The sanitary inspector, if he come scatheless through the insidious germs of zymotic disease which he is always encountering, has no prospect before him but a precarious tenure of office, under which he may be undeservedly dismised at an age when he may have great difficulty in getting another appointment. The public were, after all, most concerned in the efficiency of the sanitary inspector, and the public would not, if they knew it, allow efficient public servants to be dismissed at the caprice of a few individuals. While the tenure of office of sanitary inspectors was so uncertain, the door was opened to the admittance of men who might not be well qualified for the post,—men who, for the sake of retaining an appointment, might wink at or pass over glaring evils in property belonging to those upon whose support they were dependent for re-election. Not the least of the difficulties which sanitary officers had to encounter was the yearly change in the constitution of members forming the Sanitary Committees with which they had to deal. One year there might be on a committee one or two gentlemen who took great interest in all sanitary matters, and who, being men of good position, were above the meanness of mixing up with the jealousies and intrigues of small property-owners. At the hands of such gentlemen the sanitary inspector met with considerate treatment, and he was encouraged to be energetic and alive to his duty. Next year, however, the same committee might be very differently composed, and might include a majority of members who knew little and cared less about sanitary requirements, some of them being men who had obtained seats at the board from personal motives,—men who were pledged to oppose the officers in every way they could, and who were ever ready to protect themselves and their own immediate friends, owners of property, or their fellow-tradesmen, against the enforcement of lawful and necessary sanitary requirements. With such a committee to deal with the unfortunate officials were made to feel that to be zealous in the faithful discharge of their duties was to give offence, and too often energy gave way to lethargy, and the health of the district suffered. In conclusion, Mr. May observed that the remedy for the state of things here described was, he believed, in the hands of the sanitary officers themselves. They should combine in urging their views upon the attention of the Local Government Board, and he had no doubt that they would be influentially supported by many well-known gentlemen who had devoted much attention to sanitary matters and to the working of sanitary laws.

In the course of the discussion that followed some of the members strayed very far from the subject before them, and seemed to be at cross purposes with each other until Mr. Rumble, of East Barnet, made some judicious remarks, reminding the meeting that the Association was composed of three different classes of inspectors, viz., the metropolitan inspectors, appointed under the Act of 1866; the urban inspectors, appointed under the Act of 1875; and the rural inspectors, also appointed under the Act of 1875. Most of the speakers who had taken part in the discussion had, as it seemed to him, looked at the matter too much from their own point of view, but they should remember that, while the three classes of members were somewhat differently situate, they had common objects in view, and those common objects were not merely to endeavour to improve the *status* of sanitary inspectors as a body, but to discuss sanitary questions with the view of arriving at the best modes of procedure under all circumstances. Incidentally, allusion was made by other speakers to the question of housing the poor in London and other large towns, and the opinion was expressed that there was a great deal of exaggeration in much that was being said and written on the subject at the present time. It was generally admitted by the metropolitan sanitary inspectors who spoke that they were left quite free and unfettered in the fearless discharge of their duties, for although occasionally they might incur the ill-will of some interested property-owner, they were generally sustained in their action by the support of a large majority of the members of the vestries and boards whom they served. On the other hand, it was admitted that urban inspectors in small towns, and rural inspectors, were restrained in the active performance of their duties by something very much in the nature of intimidation on the part of those to whom they ought to be able to look for support. One member (a metropolitan inspector) expressed it as his deliberate conviction that the medical officers of health were the great hindrances in the way of efficient sanitary work. "Remove the medical officers of health," said this gentleman, "and give the inspectors 'a rattling good screw,' and the sanitary work of a parish would be better done, and the death-rate would not fall" (*sic*). It is only right to say that this view, with one or two other remarkable propositions laid down by the same speaker, was strongly repudiated by the members present.

There was a large attendance of members at this meeting, and when the society gets in full working order it will, no doubt, do much useful work.

The Victor Emanuel Monument in Rome.—The latest news is that this monument, by mutual agreement of civil and ecclesiastical authorities, is to be erected in the first chapel to the right on entering the Pantheon, and not in the middle of the building.

ELEVATION OF TERRACE HOUSES, DOVER.

This is a design for a terrace of houses about to be built on an estate in the neighbourhood of Dover. We call attention to it as a good example of the additional interest which may be given to such rather utilitarian architecture by a varied treatment of the separate houses. In this case the gables are all treated differently, though preserving a sufficient general uniformity of size and proportion. There would be much more interest in our street architecture if this kind of partial variety were oftener adopted in terraces and streets, instead of a mechanical repetition of the same identical design. The architect is Mr. J. Treadway Hanson.

THE CONGREGATIONAL SCHOOL, CATERHAM,

FOR THE SONS OF MINISTERS.

The new building (of which we give an illustration) is intended to receive the school long established at Lewisham, which has for some time past outgrown the present building, which is situated in a low part of Lewisham, very difficult of access and prejudicially affected by its close proximity to the railway.

The edifice in course of erection has been designed by Mr. E. Cookworthy Robins, F.S.A., of 14, John-street, Adelphi, who was the architect of Milton Mount College, Gravesend, and of Walthamstow Hall, Sevenoaks, for the daughters of ministers and the daughters of missionaries respectively. Mr. Hobson is the builder, and Mr. Woodley the resident clerk of works.

The design was selected in limited competition, and affords accommodation for 150 resident students in three stories. There are two wings in the rear, 67 ft. by 30 ft. wide, set at right angles with the main front of the building, which is 200 ft. in length, and situated on the eastern slope of the hill overlooking the beautiful Caterham Valley.

The space in the rear between the wings is occupied by the gymnasium, 55 ft. square, and the lavatory and cloak-room, 55 ft. by 13 ft wide. A corridor extends the whole length of the building from north to south, and is continued beyond the main building to connect it with the existing residence called Withernden, which is retained for the head master's house. In the rear are the kitchen offices, with covered corridor thereto.

The building is designed in the Old English style, with red brick facings and Ham Hill stone dressings. The chief entrance is in the centre of the main front, and is boldly designed and executed in stone. Above it are two stories of bay windows, with multitudinous casements. The tiled roofs are effectively broken up by half-timbered gables of varying sizes, upon which the picturesque grouping of the building depends.

The rooms on the ground-floor on the right of the main entrance are entirely devoted to educational purposes, and consist of a series of class-rooms, averaging 21 ft. square, and a large school-room for collective teaching situated in the southern rear wing, 55 ft. by 27 ft., with a chemical laboratory beyond it.

On the left of the entrance are the reception-rooms, master's room and library, with a noble dining-room in the northern rear wing, 65 ft. long by 27 ft. wide, at the eastern end of which is the hatch communicating with the kitchen.

At the northern and southern ends of the main corridor respectively are the two stone staircases which give access to the upper stories, containing five large dormitories for thirty beds in each; a separate lavatory adjoins each dormitory, fitted with sixteen basins, and overlooked from the master's bedrooms.

Over the southernmost class-room and south of the staircase are the wardrobe-keeper's work-room and bed-rooms, over which is the bath-room for ten baths.

The laundry, the swimming-bath, the infirmary and the lodge are not included in the present contract, which is under 17,000*l*.

The grounds have been arranged for their future erection, and a winter playground and cricket-field provided for.

The site is exceptionally beautiful, and is 13 acres in extent. The building is to be opened in July next.

MANCHESTER AND SALFORD WO

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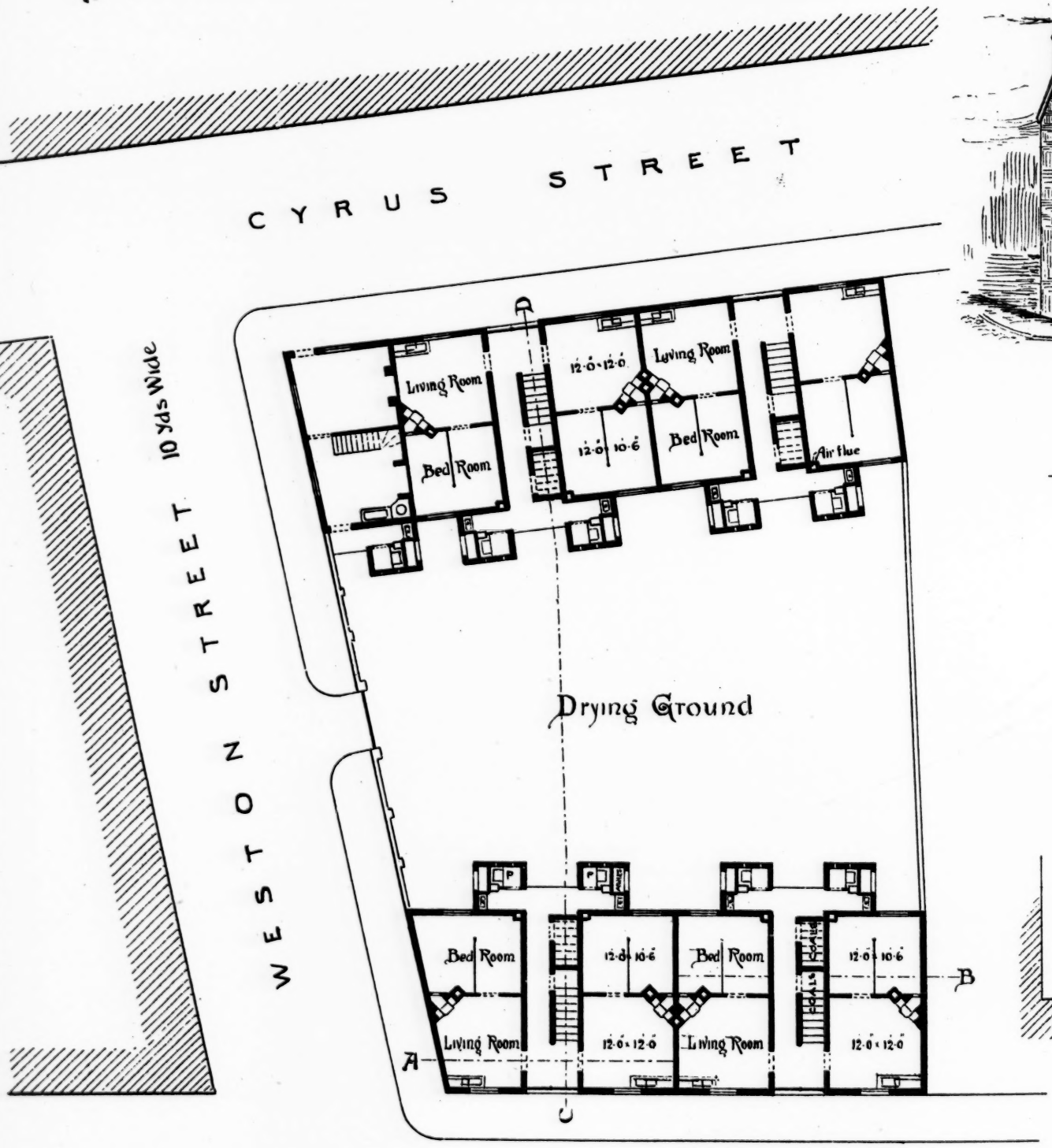

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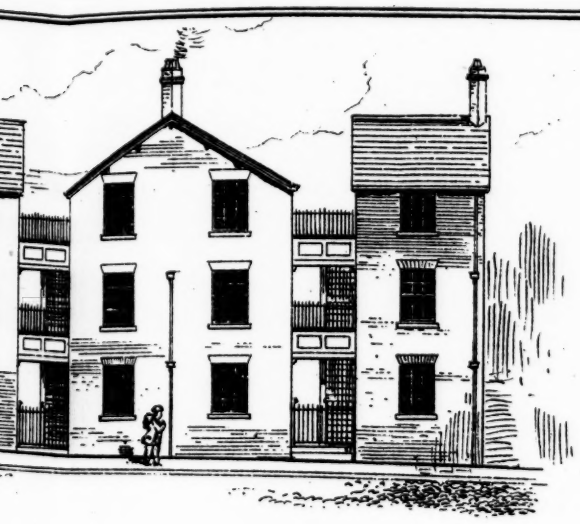

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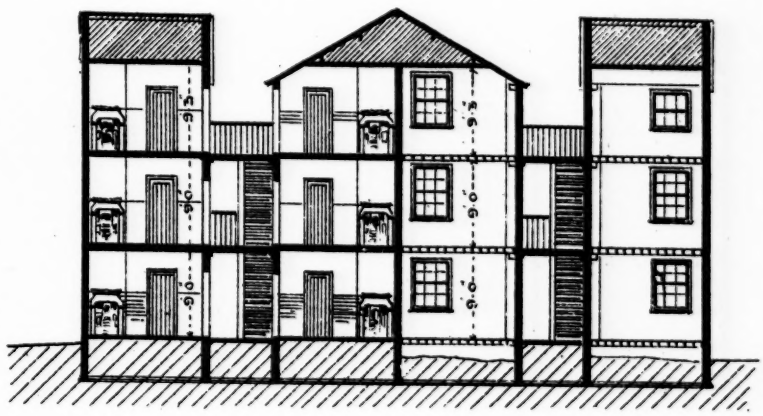

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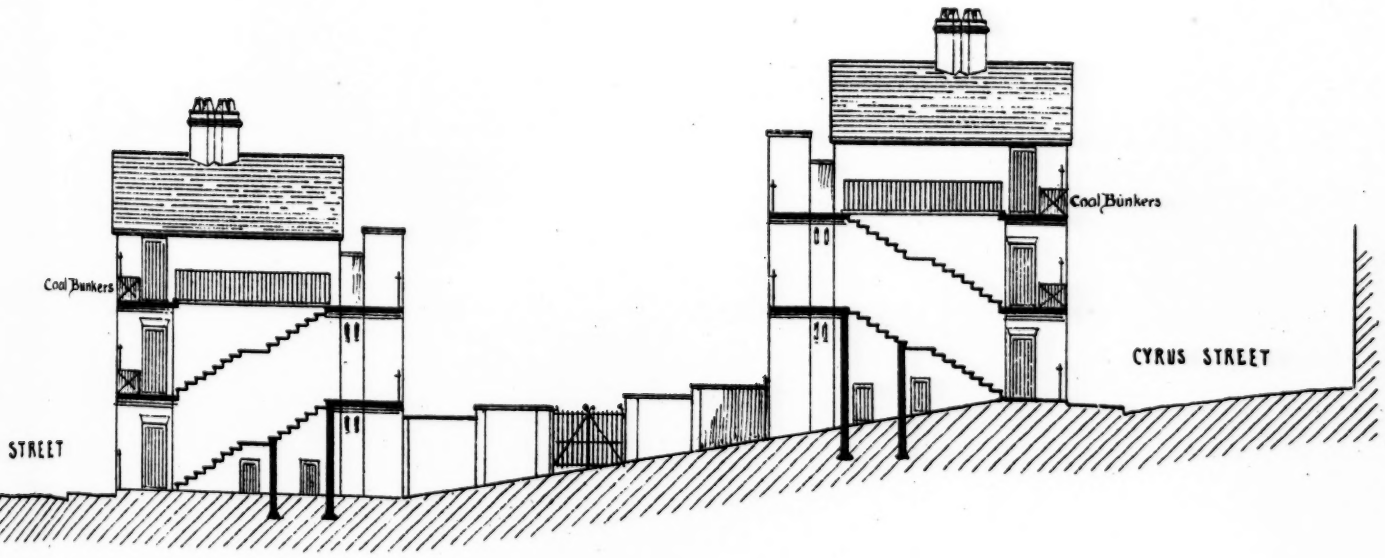

SECTION THRO C.D

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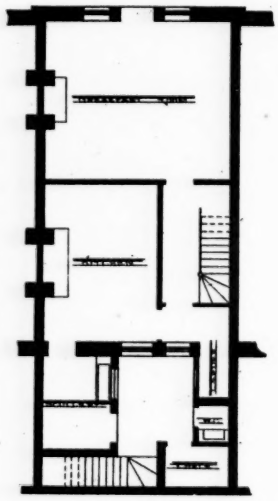
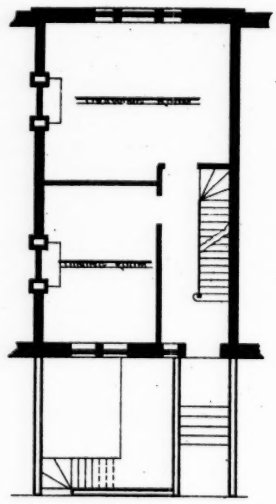
erected at Holt Town Manchester

LAWRENCE BOOTH F.R.I.B.A.
Architect. 88 King St. Manchester.

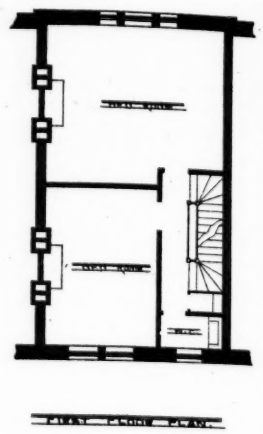
G. Queen St. London. W.C



BASEMENT PLAN.



GROUND PLAN.



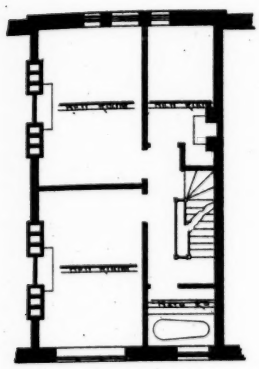
FIRST FLOOR PLAN.

A.C.Wisenden. del.

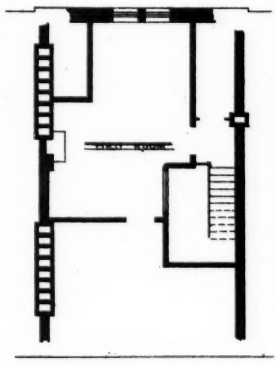
Scale

Wyman & Sons, Photo-Litho.

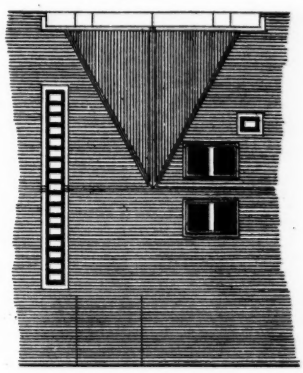
HOUSES ABOUT TO BE ERECTED AT DOVER, K



SECOND FLOOR PLAN.



ATTIC PLAN.



ROOF PLAN.

J. TREADWAY HANSON, F.R.I.B.A.

C^t Queen S^t London, W.C.

OVER, KENT.—GARDEN ELEVATION FACING SEAWARDS.

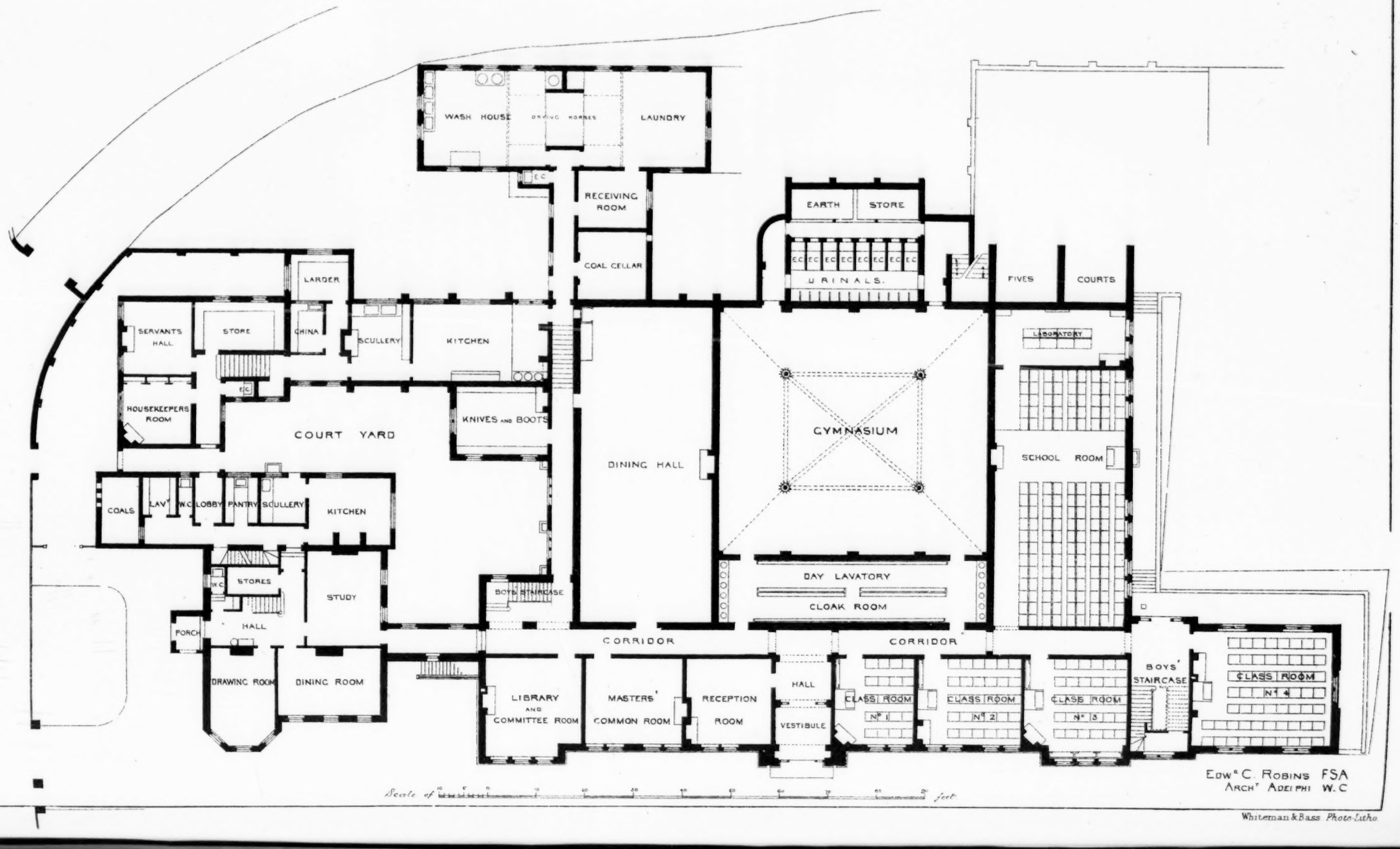
Wyman & Sons Photo-Litho

C^t Queen S^t London W.C

NEW WESLEYAN CHURCH, GOSFORTH.——Mr. J. J. Lish, Architect.

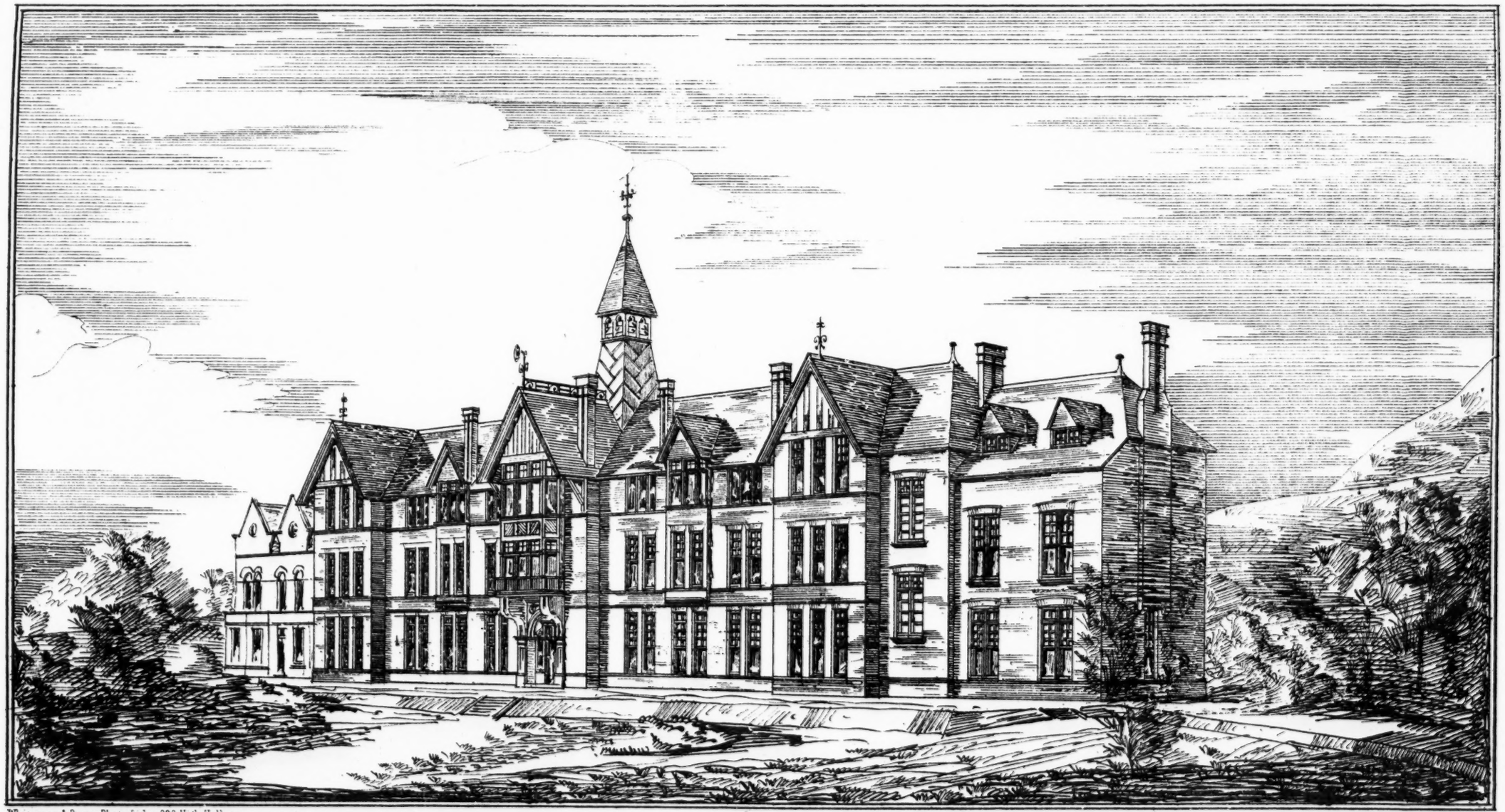
Congregational School Caterham

Ground Floor Plan



Edw.d C. Robins FSA
Archt Adelphi W.C

Whiteman & Bass Photo-Litho



Whiteman & Bass. *Photo-Litho* 236. High Holborn.

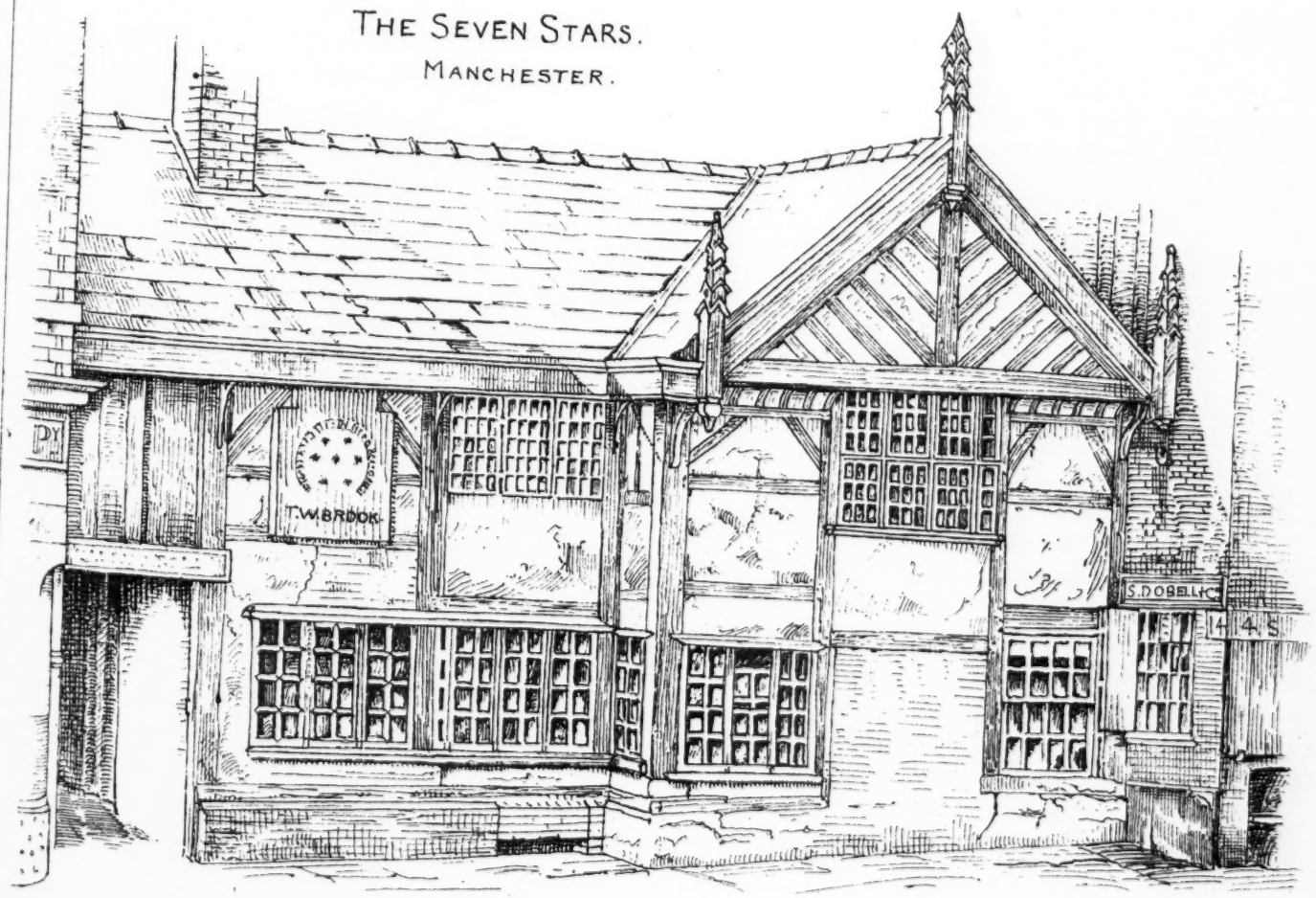
Congregational · Schools · Caterham · Valley ·

EDW.D C. ROBINS. F.S.A. ARCH.T
14 JOHN. ST W.C.

OLD LANCASHIRE INNS.

THE OLD BOARS' HEAD.
MIDDLETON.

THE SEVEN STARS.
MANCHESTER.



Walter Aston.
June 1883.

Wyman & Sons, Photo-Litho
C^t Queen S^t London, W.C.

GOSFORTH WESLEYAN CHURCH.

THIS church is situate in a growing suburb of Newcastle, and is planned to seat 750 persons. A large schoolroom, four class-rooms, a minister's vestry, and a caretaker's house, &c., are placed in the rear.

The church is divided into nave, aisles, and transepts, with a large apsidal chamber for organ; a good local freestone being used for the buildings. Hot water is to be employed throughout for heating, and the ventilation has been very carefully considered.

Mr. Thomas Humble, Gosforth, is the contractor for the works, which are estimated to cost in all about 4,500*l*. Mr. J. J. Lish, Newcastle-upon-Tyne, is the architect.

OLD LANCASHIRE INNS.

The Old Boar's Head, Middleton.—This inn is on the high road between Manchester and Rochdale. The present building dates from the middle of the seventeenth century; the foundations, however, are said to be older, and it is supposed that these are the remains of the old vicarage. The fine parish church, of Norman foundation, is on a hill just above. Within the last few years, the old sign was still swinging across the road, but no doubt it was far too picturesque to be left alone.

The Seven Stars, Manchester.—This is said to have been a licensed inn since 1356. The record of this is kept in Lancaster Castle. There is a tradition that when the workmen were building the collegiate church, now the cathedral, and were then receiving a penny a day, they had their meals here. There is a very old chimney-piece in one of the rooms. The building must, however, have been almost entirely rebuilt since the fourteenth century, and in some places old casements have been removed and sash-windows have taken their place. Not many years ago there were numbers of old half-timbered houses in Manchester, and now there are only about half a dozen left.

INTERNATIONAL HEALTH EXHIBITION.

IT is proposed to hold, during the year 1884, an International Health Exhibition, which shall also illustrate certain branches of education, and which will occupy the buildings at South Kensington erected for the International Fisheries Exhibition.

The object of the Exhibition will be to illustrate, as vividly and in as practical a manner as possible, Food, Dress, the Dwelling, the School, and the Workshop, as affecting the conditions of healthful life, and also to bring into public notice the most recent appliances for elementary school teaching and instruction in applied science, art, and handicraft. The influence of modern sanitary knowledge and intellectual progress upon the welfare of the people of all classes and all nations will thus be practically demonstrated, and an attempt will be made to display the most valuable and recent advances which have been attained in these important subjects.

The Exhibition will be divided into two main sections, Division I., Health; Division II., Education; and will be further subdivided into six principal groups.

In the first group, it is intended specially to illustrate the food resources of the world, and the best and most economical methods of utilising them. For the sake of comparison, not only will specimens of food from all countries be exhibited, but the various methods of preparing, cooking, and serving food will be practically shown. The numerous processes of manufacture connected with the preparation of articles of food and drink will thus be exemplified; and, so far as the perishable nature of the articles will admit, full illustrations will be given of the various descriptions of food themselves.

In the second group, dress, chiefly in its relation to health, will be displayed. Illustrations of the clothing of the principal peoples of the world may be expected; and a part of this exhibition, which, it is anticipated, will be held in the galleries of the Royal Albert Hall, will be devoted to the history of costume.

In the third, fourth, and fifth groups will be comprised all that pertains to the healthful construction and fitting of the dwelling, the school, and the workshop; not only as respects the needful arrangements for sanitation, but also the fittings and furniture generally in their effect on the health of the inmates. The most improved methods of school construction will be shown, and the modes of combating and preventing the evils of unhealthy trades, occupations, and processes of manufacture will form portions of the exhibition.

The sixth group will comprise all that relates to primary, technical, and art education, and will include designs and models for school buildings; apparatus and apliances for teaching; diagrams, text-books, &c. Special attention will be directed to technical and art education, to the results of industrial teaching, and to the introduction of manual and handicraft work into schools.

The following is a general classification of the six groups:—

DIVISIION I.—HEALTH.

Group I.—*Food and Drink.*—Selected foods and preserved food products; the supply and economic distribution of wholesome and nourishing food and drink; the conveyance of fresh provisions; the detection of adulteration and impurities; food analyses and food constituents; cooking and practical dietetics, including varieties of diets consumed by different nations; new descriptions of food; food for the young and for invalids; army and navy rations; prison and workhouse diet; domestic economy.

Group II.—*Dress for all Climates for both Sexes and for various Purposes.*—Examples of national costume of all classes,—retrospective and modern collections; new and improved wearing apparel, and designs and materials for the same; specimens of improvements in the design, material, and the making of clothing and cheap dresses; dress for exercise and sport; uniforms; life-saving and fireproof dress.

Group III.—*Dwellings for all Classes: their Sanitary Construction, Fittings, and Appliances.*—Improved materials for external and internal construction; damp-courses; non-conductors for walls and roofs; wall linings and cements; non-poisonous paints and paperhangings; solid floors; washable materials for construction and decoration; ventilation of houses and apartments; air-cooling, heating, and purifying apparatus; apparatus for heating and for the abatement of smoke; heating by open grates and stoves; hot-air, steam, and gas apparatus; improved kitcheners and gas cooking-stoves; lighting by gas and electricity, fittings and apparatus for the same; fire prevention,—extincteurs, hydrants, escapes, preservative solutions; water supply, and improved sanitary fittings connected therewith, — meters, cisterns, filters, softening apparatus, baths and lavatory apparatus and fittings; house-drains, their construction and ventilation; closets; sewer disconnexion, sinks, traps, gullies; the disposal and utilisation of house refuse.

Group IV. *Schools.*—Buildings for town and country schools; yards and playgrounds for schools; fittings for school latrines and lavatories; heating, lighting, and ventilation of schools; apparatus for physical training, gymnasia; school kitchens; storing of hats, cloaks, &c.; drying ditto in wet weather; isolation of diseases in schools; school infirmaries.

Group V.—*Workshops and Factories.*—Models and designs for improved workshops, especially those in which unhealthy, noxious, or dangerous trades and processes are carried on. Improved apparatus and plant for the same. Guards, screens, special dresses, and objects for personal wear to avoid or prevent injury from manufacturing processes. Illustrations of special diseases and deformities caused by unwholesome trades and occupations. Means of guarding against the same. New inventions or improvements for the better carrying on of dangerous or unhealthy processes of manufacture; models, diagrams, &c.

DIVISION II.—EDUCATION.

Group VI.—*Educational Works and Appliances.* Apparatus and fittings for *crèches* and infant schools; appliances for teaching; Kindergarten models, and examples and results of instruction; primary school fittings and apparatus; examples and models for teaching practical manual work to girls, and various handicrafts to boys; apparatus and models for science teaching; apparatus and models for art teaching; designs and fittings for apprenticeship and industrial schools; apparatus for instruction in such schools; specimens of work done in these schools; schools for the blind and for the deaf and dumb; apparatus and results of teaching in such schools.

*** It is proposed to arrange collective exhibits in connexion with some of the above classes, illustrating, among other subjects, the dwellings of the poor, the care in the dwelling for the welfare of the children and of the sick, model nurseries, sleeping-apartments, completely-fitted kitchens, fully-equipped gymnasia for adults and the young, model laboratories and collections for health-teaching, model schools, workshops, &c., and also collections having reference to special trades.

It is also proposed to hold an International Congress in June or July next, on each of the main sections of the Exhibition,—Health and Education.

Lectures will be given, and conferences will be held on the various subjects illustrated in or cognate with the Exhibition; they will be explained by practical demonstrations and experiments, and Reports on each group will be issued.

Processes will be shown in actual operation, and practical tests will, from time to time, be made of the inventions submitted to the juries.

Mr. E. Cunliffe Owen is the secretary.

ST. MARY'S HOSPITAL, PADDINGTON.

ON Saturday afternoon last a party of members of the Clerks of Works' Association paid a visit to the new buildings at St. Mary's Hospital, Paddington, where they were received by Mr. R. Wheeler, the clerk of the works in charge.

The new wing (which has been built as the result of a bequest of 25,000*l*. made by Mr. J. F. Stanford, of St. John's Wood, for that express purpose) includes a dry and well-lighted basement, ground floor, and four floors above. The basement contains a students' club-room, library, refreshment-room, kitchen, &c. On the ground-floor is a large and well-lighted ward, 100 ft. by 24 ft., with bath-room and w.c. at one end, and scullery, w.c., and slop-sink at the other end, well-ventilated lobbies intervening between the ward and the closets. This ward has a dado of coloured glazed bricks, the upper portion of the walls being faced with Parian cement. The bath-room, scullery, lavatory, and w.c.'s are also lined with glazed bricks, supplied by Messrs. Cliff & Sons. On the first floor is the new chapel, 46 ft. by 24 ft., provided with a small room at the end for the use of the chaplain. Polished oak seats are provided for the choir. For the congregation the seats from the old chapel have been altered and adapted. The windows are filled with tinted cathedral glass, except two, which are reserved for stained glass, one of them being, indeed, already filled as a memorial of one of the "Sisters" of the hospital, who died this year. On the same floor is a ward, 46 ft. by 24 ft., with scullery, lavatory, w.c., slop-sink, &c., all lined with glazed bricks, and cut off by a lobby. Approached from and on a level with this floor is a pleasant balcony for the use of the patients. This balcony is 110 ft. long and 7 ft. wide, with an enclosed space in the centre for use in bad weather and for shielding the more delicate patients from rough winds, though at the same time enabling them to breathe fresh air. The balcony is supported on iron columns, and has an open-work iron front, the ironwork having been executed by Messrs. Cottam & Co., of Winsley-street, Oxford-street. On the same floor is a room for the use of the Sisters. The second floor contains two wards, 46 ft. by 24 ft. each, provided with similar conveniences to those in the wards already named. Another room for the Sisters is provided on this floor, which is also provided with a balcony similar to the one on the level of the first floor. The third floor, which is for the use of the Sisters and nurses, contains ten bedrooms, one sitting-room, two bath-rooms, and a water-closet. The corridor from the corresponding floor of the existing building is continued into the wing, returning round both ends. A balcony the same as those below is provided for the nurses. The fourth floor contains special wards for the isolation of contagious cases that may develop themselves after admission into the general wards. One of these wards is 28 ft. by 20 ft., with a glazed brick dado. There are two smaller wards, each 20 ft. by 11 ft., the walls of which are lined with bricks in four colours from floor to ceiling. On the same floor are three nurses' rooms, with other conveniences. On top there is a lead flat, 100 ft. by 24 ft. 6 in. Between the old hospital building and the new wing there is a stone staircase leading from the basement to the lead flat; the well-hole of this staircase is fitted with a hydraulic lift, which, together with two new boilers in the old part of the hospital, has been fixed by Messrs. Easton & Anderson. Above the staircase is a tank holding 7,000 gallons of water, fixed inside the tower, the top of which is 120 ft. above the ground level. The wards, chapel, library, and students' club, &c., have gas laid on, with star lights hung from the ceiling. The gasfitting has all been done by Mr. Verity, of High-road, Knightsbridge. The windows to the wards and sculleries are opened and closed by means of Adams's patent gearing. All the chimney-

pieces for the wards and nurses' rooms were made and fixed by Messrs. Belcher & Co., of Gloucester. The outside facing of the new wing is in wire-cut red bricks from Mr. Lawrence's brickyard at Bracknell. The architect is Mr. Stephen Salter, Mr. R. Wheeler being the clerk of works. Messrs. Higgs & Hill are the contractors, Mr. J. Steward being their foreman.

Besides the new wing, a new out-patients' department has been provided, and the premises for the use of the medical school have been enlarged. The new out-patient department contains consulting-rooms, large general waiting-room, dispensary and dispensary waiting-room, registrar's enclosure, &c. Arrangements are made whereby the patients are attended to in the order in which they arrive, passing out by a different door to that at which they entered. The medical school buildings contain a museum, committee-room, room for special classes, curator's room, chemical theatre, anatomical theatre, physiological room, anatomical class-room, and dissecting-room, — the latter lined with coloured glazed bricks from floor to ceiling.

Afterwards the visitors were very kindly conducted by the Secretary to the Hospital (Mr. Pietro J. Michelli) through certain of the wards and other portions of the old building.

We shall be excused for commending this hospital (which is without endowment) to the support of those of our readers who may be able to help it. The old building was commenced in June, 1845, the first stone being laid by H.R.H. Prince Albert. It was opened for fifty beds on the 13th of June, 1851, and for 150 in June, 1852. On the 23rd of May, 1865, the first stone of a wing to the hosital was laid by H.R.H. the Prince of Wales, and was spened in May, 1867. This addition enabled the hospital to receive from 180 to 200 in-patients. From 1867 to the present time, or for sixteen years, the accommodation afforded by the Hospital has remained the same, although the population dependent upon it has greatly increased. The cost of keeping up this new wing will add upwards of 2,000*l.* to the yearly expenditure. The income of the Hospital barely suffices to meet its present expenses; and, unless additional funds are forthcoming, the new building cannot be opened, or only to a very limited extent. Meanwhile the need of the further accommodation thus being provided in most pressing. The wards of the present building are over-crowded, and only the most serious cases can be admitted.

THE FLORIDA SHIP CANAL.

General Stone, the chief engineer of the ship canal across the peninsula of Florida, has made a report to the directors, in which he states that the length of the proposed cutting will be 139½ English miles. It will be wide enough to admit of two steamers of the largest size passing through it abreast, and he estimates the entire cost of the work at 46,000,000 dollars. When the canal is completed, it will lessen the distance between New Orleans and Liverpool or New York by 412 miles. General Stone and his assistants have finished the preliminary survey. The question the company has to settle is whether the traffic, in prospect, promises to be sufficiently remunerative to justify the large necessary outlay in the execution of the scheme. The chief engineer, in support of his opinion that the scheme will be a commercial success, points out that, in addition to lessening the distance between the chief ports on the Gulf of Mexico and Europe and the Atlantic seaports, the canal will effect a saving of from three to seven days in time. In the case of large ocean steamers this will be equivalent to a reduction of expense amounting to 500 dollars in wages, food, and so forth, in addition to from 300 to 500 dollars a day for fuel. Moreover, the Straits of Florida are among the most dangerous through which a vessel can pass, and the annual loss by shipwreck there is very large. The saving in insurance on vessels and cargoes will amount to from 1 to 1½ per cent. when the canal is finished. Further, a large increase of shipping engaged in the conveyance of cattle from Texas, and maize and cotton from the States on the Lower Mississippi, would be certain to follow. General Stone states that the highest point through which the canal would have to be cut is considerably lower than the loftiest point through which the Suez Canal was carried. The realisation of the scheme might, perhaps, slightly injure New York for a time, but the advantages are so great that, in the opinion of competent Americans, it is sure to be carried out sooner or later.

EFFECTS OF UNHEALTHY OCCUPATIONS.

This was the subject of a lecture (forming one of a series) delivered in the Free Assembly Hall, Edinburgh, a few evenings back, by Dr. Andrew Smart, under the auspices of the Edinburgh Health Society.

Dr. Smart, at the outset, said his subject did not include the professions, but he indicated that, as a rule, the clergy were the longest lived among the people; the legal profession came second; while the average life of medical men fell considerably short of either. Nearly all trades and manufacturing processes are attended by the evolution of dust, or of volatile particles, more or less considerable and more or less hurtful. Persons habitually breathing a dust-laden atmosphere of this kind acquire a liability to diseases of various sorts; but as the inhaled dust is necessarily, in every instance, brought into contact with the lungs, it is accordingly the pulmonary organs that chiefly suffer in the end. Speaking, in the first place, of the effects of metallic dust, Dr. Smart instanced the steel-workers of Sheffield. Were you to enter one of the busy workshops of Sheffield, and, for a time, amid the turmoil of machinery, attempt to breathe its stifling atmosphere charged with minutely-pulverised dust, emitted by hundreds of wheels, you would a have a practical experience of the cause why few, if even one, of all the workers there, will ever reach their fortieth year. The average duration of life among the dry-grinders of forks is twenty-nine years; of razor-grinders, thirty-one years; edge-tool-grinders, thirty-two years; spring-knife and file grinders, thirty-five years; and saw and sickle grinders, thirty-eight years. The cause of this excessive mortality is apparent. In every hundred sick among the needle-makers, seventy are consumptive; and among the file-makers, sixty-two in the hundred are consumptive; and, taking the steel-grinders all round, rather over forty in the hundred are consumptive. In the same way, Dr. Smart pointed out the effects of their occupation on workers in copper and white lead. Consumption among them is the predominant disease; and in every 100 sick lithographers, for instance,—workers in copper,—one-half nearly (48·0) are consumptive. In pointing out the effects of mineral dust, Dr. Smart said that notoriously over-topping all the other dusty occupations in their effects upon life and health were those of the grindstone-makers, flint-cutters, and glass-polishers. The condition under which their work is carried on is in the highest degree favourable to the production of pulmonary disease. They work in an atmosphere loaded with sharp spiculæ, which lacerate the lungs, and quickly induce consumptive disease. Every grindstone-maker is cut down with it at, or soon after, the age of twenty-four. Hardly one escapes. The flint-cutter and glass-polisher have each eighty deaths per hundred sick of consumption, and their average life is under thirty years. Again, the stone-cutters or stone-masons (not builders) terminate their average life at the age of thirty-six years,—thirty-six in every hundred sick being consumptive. It is stated on the best authority that three-fifths of the flax mill workers of Belfast,—the chief centre of that textile manufacture,—are consumptive. In other words, sixty in every hundred die of that disease. The average life of the weavers of this restricted class is forty-four years, whilst that of weavers in general is about fifty-seven. Carpenters, joiners, and cabinet-makers are affected by their dusty occupations,—each group having fourteen consumptive cases in every hundred. After describing the asthmatical and bronchial affections induced by inhaled gases of an irritant character, Dr. Smart proceeded to speak of the effects of constrained bodily position, restricting attention to three well-known classes,—needlewomen of every class, tailors, and shoemakers. They suffer from consumption in a nearly equal degree. The tailors and needle-women have each nineteen deaths from consumption per hundred sick. The shoemakers fall short of that number only by a fraction, being 18·7. Speaking next on the effects from poisonous metals, Dr. Smart illustrated the subject by exhibiting a favourite and much used arsenical wall paper, which, in an ordinary-sized room, would contain 20,000 grains of arsenic, which was easily detached, and diffused through the room as dust. Hair restorers and face-enamelling were liable to similar objections. On this point he suggested legislation, such as that recently adopted in Germany, for the restriction of the manufacture of those poisonous colours and pigments. Carefully scanning the various employments embraced by the entire industrial class, he reckoned that a proportion of one-tenth of their number suffers,—that is, 850,000 are thus exposed to the injurious effects of their occupations. The first and immediate effect of this is that every member of this 850,000 has his life reduced to an average of forty-five years. Taking sixty years as a fair average standard to which each ought to attain in favourable surroundings, we observe that each of these workmen loses fifteen years of his working life. It therefore follows, as three times fifteen complete the average life of forty-five, that every fourth man of the number above stated annually drops out of account as completely as if he had not existed. The practical result of this mode of computation is that 212,500,—a number nearly equal to the inhabitants of Edinburgh,—are annually struck out of the roll of life, and absolutely lost to the State during the whole period of their lives. In the face of an evil of such increasing magnitude there could not be any remedy short of its prevention. Proceeding to discuss the means of preventing the effects of unhealthy occupations, Dr. Smart said the problem to be solved was this,—How to environ each worker in the prosecution of his work with a pure atmosphere? It was not for him to undertake the solution of this problem, because he held that to be a matter for which the responsibility rests upon the Legislature. He was, nevertheless, free to express his confident conviction that this result appeared to be only a question of certain simple, practical, mechanical adjustments, requiring no effort of genius, or even outlay, where there is so much already existing machinery. The Legislature having, by means of the Factory Acts and otherwise, assumed the responsibility of regulating much in connexion with our great industries, it would seem that we must necessarily fall back upon Government regulation and control as the only available remedies for these evils. Previously to the passing of the Factory Acts the ill effects of their work upon the health of the workmen were so notorious that, in response to the wish of the country, a Commission was appointed in 1833 to inquire into their causes. The Factory Acts were, at that time, undoubtedly a great boon to the people; but it is evident that they are not now fitted to accomplish the object for which they were intended in the sanitary regulation of our industries. The facts eliminated prove this, and also that an inquiry is urgently necessary. The vast increase in the country's industrial resources and population since 1833, together with corresponding improvements in machinery and in chemical appliances, have altered the entire complexion of our industrial occupations, and have led to insanitary conditions which demand a remedy as much as did those for the removal of which the Factory Acts were originally passed. It was his contention that our great operative industrial class was entitled to be cared for and protected, as to their health, in the pursuit of their vocations. They were the backbone and sinews of the nation's strength. He estimated that nearly a quarter of a million of these men were annually lost to the State. For a moment, consider the effects of the loss from a merely economical point of view. Taking the figures, as he had already given them, to be 212,500, and reckoning each man's wages at 1*l.* a week, there is thus a yearly loss in wages to the industrial wage class amounting to 21,250,000*l.* If we now add to this the loss of capitalised labour, there results the grand total of 27,120,500*l.*, the whole of which is annually lost to the country. In point of fact, that sum would, in twenty-nine years, more than clear off the whole of the National Debt. So much for the money aspect of the question. But what of the needless waste of life and its attendant sickness; of the consequent impoverishment, pauperism, and demoralisation; and the increasing legacy of hereditary disease? Could Adam Smith reappear, he would, looking back, and gathering up the lessons

of the past, place a prefatory note to his "Wealth of Nations," somewhat in these terms:—There are two primary and fundamental considerations upon which national stability and permanency rest. The first regards the health of the people,—the other its education. Any system of government, without full provision being made for these, will be incomplete; and, in regard to the former, the best guarantee of a nation's security will be wanting. Therefore, above all things, let no government, in its administrative capacity, be without its health department, presided over by a wise and energetic Health Minister, whose supreme duty it shall be to create and to vigilantly adminster laws, the aim of which shall be to protect the health of every subject, and especially to surround that of the dependent industrial population with every possible safeguard. Then, addressing his own countrymen, might we not suppose the philosopher, with increased emphasis, to add,—A nation such as ours of thirty-four millions, with a vast manufacturing industry, a most busy and flourishing commerce, an Indian Empire to govern and maintain, colonies to attract the most vigorous and enterprising of our people, great fortresses to man and defend, cannot afford to waste the lives of its citizens, any more than those whom it has chosen and trained to fight its battles? Are not labour and capital the two pillars upon which a free commonwealth rests? Disease paralyses labour and wastes capital. It ought, then, to be the primary object of an enlightened State to prevent disease, preserve health, and prolong life; and to maintain the whole people in the highest efficiency, alike for the labours of peace or the struggles of war.

LATEST BUILDING REGULATIONS IN PARIS.

1. RIDGES of all roofs in future buildings in Paris must be provided with a horizontal pathway, at least 70 centimètres (2 ft. 3½ in.) wide, for the use of workmen, firemen, and inhabitants in case of fire. This pathway to be bordered on one side by railings 30 centimètres (1 ft.) high, on the other by a handrail, at least 80 centimètres (2 ft. 8 in.) high, with sufficient network to prevent accidents. The network may be made ornamental, but the handrail must remain smooth.

2. All partition-walls and others perpendicular to façades must be provided behind with iron ladders and handrails fixed on to the masonry, and entirely independent of roofing timber.

3. Double staircases in upper stories especially, for easier flight in case of fire.

Why are not any such useful regulations enforced with us? C. H. C.

PROGRESS IN ELECTRIC LIGHTING.

WE have lately had an opportunity of seeing one or two modes of applying the electric light which, if their utility and economy are not yet fully proved, at any rate serve to show that the problem of lighting by electricity with the minimum of inconvenience in the shape of plant is engaging the attention of active minds.

The most important "installation" to which we have now to refer is that of the system of Messrs. Gaulard & Gibbs, which "The National Company for the Distribution of Electricity by Secondary Generators (Limited)" have, by permission of the Metropolitan Railway Company, applied to the lighting of several stations on that line. The inventors claim to be able to distribute electrical energy at a number (practically unlimited) of points on a single circuit of small diameter. "The great difficulty hitherto experienced in electrical transmission" (says M. Gaulard) "has been that of supplying a current which shall satisfy simultaneously the various requirements of different consumers. In other words, the currents to be utilised, whether for lighting or mechanical purposes, should be of a 'potential' variable at the will of the consumer. As, also, it is necessary to increase the tension as the distance increases, it follows that beyond a certain distance it is impossible to employ receivers which cannot support currents of considerable potential; it is thus that the lighting of incandescent lamps cannot be accomplished beyond a distance of 500 yards from the dynamo machine, and then only by using conductors of very large diameter. Further, it has long become evident that, notwithstanding its numerous advantages, the electric light can only be popularly applied when the consumer is relieved of the necessity of having on his premises such cumbersome material as dynamo-machines and steam-engines, and when also he can himself manipulate electrical energy with the same facility as he now does gas and water, so as to transform it into electric currents of different natures, and, consequently, applicable to various purposes, such as incandescent and arc lighting, motive power, electro-chemical processes, &c." The method by which the inventors arrive at a solution of the problem is shown in the installation on the Metropolitan Railway, where they now have a single circuit fifteen miles long, composed of a cable 4 millimètres (8 B.W.G.) in diameter, connecting the stations of Notting Hill-gate, Edgware-road, Gower-street, King's-cross, and Aldgate. This primary circuit is metallically closed with the generating dynamo, and, whatever the electro-motive force traversing it, may, we are assured, be touched at any point without danger, and without even perceptible "derivation." A force of 30-horse-power, produced at Edgware-road Station, and transformed by means of a Siemens's alternating dynamo machine into a current of 2,000 volts and 10 ampères, is distributed by the secondary generators at the stations mentioned; currents of various potential, suitable for both arc and incandescent lamps, being produced at each station. To explain the working of this system as briefly as possible, it might be said that the primary circuit passes through each of the secondary generators, which are, so to speak, "fed" by it, and distribute the currents required for lighting or other purposes in their locality. It will be observed that while there are five stations, the primary generating apparatus is located at one point only, viz., the Edgware-road.

Another means of electric illumination which we have seen in action is the primary battery of Messrs. Holmes & Burke, which was recently exhibited at No. 31, Lombard-street by Colonel J. D. Shakespear. The foreign patents not being quite completed, the detailed construction of the batteries cannot yet be described. It may, however, be stated that carbon and zinc are employed, and that the patent consists in the mechanical arrangement of the battery and the nature of the chemicals used in oxydising the zinc. It is stated that a sixteen-cell battery is equal to the supply of eighteen incandescent lamps of five-candle power each. A number of Swan lamps of this power were arranged in a room at the above address, and produced a very good effect, the light being brilliant and steady. The lamps were supplied from a battery placed in an adjoining apartment. A lamp for lighting railway-carriages was also shown, and gave an excellent light. Some little time ago one of these batteries was fitted in one of the carriages of the 5.40 p.m. Great Northern express train (King's Cross to Leeds). With regard to duration of lighting, it is stated that the batteries will remain active for twenty-four hours in full work without being touched, and that the light can be produced at an average cost of ¼d. per light per hour.

While on the subject we may mention that, after extensive alterations and redecoration, Messrs. Gatti's Adelaide Restaurant, Strand, is now lighted by means of about 330 Edison incandescent lamps, and with very excellent effect. A special feature in connexion with the lighting is the duplication of the generating plant. There are two "Field" boilers, two Armington engines, and four Edison dynamos. The steam-piping is so arranged that either engine can be run from either boiler, and the shafting so that any two of the dynamos can be driven by either engine. If one boiler should fail the other would supply sufficient steam to drive one engine; if one engine stopped the other would still run two dynamos, which in turn could sustain the entire number of lamps.

We append some further particulars of the electric light plant erected at the First Avenue Hotel, Holborn (recently described by us), by the Hammond Electric Light and Power Supply Company, Limited. The number of lamps throughout the building is 1,200. The lamps are placed in all the public rooms, including halls, corridors, drawing-rooms, dining-rooms, offices, bedrooms, &c. The fittings are by Messrs. B. Verity & Son; the leads by Messrs. Paterson & Cooper. The current is generated by a Ferranti dynamo-machine, capable by its internal construction of feeding the whole of the lamps or any lesser number without its speed being altered. In order to completely guard against breakdown, the whole of the plant is in duplicate, each set consisting of 1-1000-light "Ferranti" dynamo, one Gwynne's 120-h.p. engine, and one Adamson's boiler. It is claimed that every light can, night or day, be turned out or on separately by a switch as easily as a gas-tap, and by the use of the "Ferranti" machine any number of lights can be turned out at once, without any communication with the engine-room. It is stated that the cost works out almost exactly the same as gas, but the hotel has the advantage of its decorations, &c., being preserved intact.

THE BENTINCK DOCK, KING'S LYNN.

THE last stone of this dock was recently laid by His Grace the Duke of Portland. The work constitutes an extension of the Alexandra Dock, opened by the Prince and Princess of Wales in 1869. The new dock is described as capable of easily accommodating 1,000,000 tons of miscellaneous shipping per annum. The basin (in the formation of which about 500,000 cubic yards of earth were excavated) is 1,000 ft. long by 400 ft. wide, and 32 ft. deep. The depth of water at ordinary spring tides will be 27 ft. 6 in. The side walls are formed entirely of concrete, and have consumed close upon 10,000 tons of Portland cement; the wing walls are faced with blue Staffordshire bricks. At the northern end, to allow of future extension at an easy cost, instead of having an upright quay wall, there is a slope, at an inclination of 1 to 1, faced with concrete in blocks 21 in. thick There are twenty-four cast-iron bollards or mooring-posts, built into the walls at convenient distances; and there is also to be a coal-drop, for which, however, the machinery is not yet ordered, but which, when complete, will transfer coal from railway trucks direct into ships at a trifling cost. The area of the basin is 9½ acres, and the area of the quays, which are all level with the coping, is 40 acres. The construction of the lock, or rather channel, which connects the old and the new docks, formed, perhaps, the most difficult part of the undertaking. At the place where it was to join the basin of the Alexandra dock a coffer-dam had to be formed, and it necessitated the employment of divers for several months in cutting away the concrete slopes to enable the piles to be driven into the ground. This dam has had to stand a pressure of water varying from 20 ft. to 30 ft. deep, and notwithstanding the high tide of March last, when many of the low-lying districts of Lynn were inundated, the dam stood the enormous pressure which it had to bear. The lock is about 300 ft. long by 50 ft. wide, and has one pair of gates, made of greenheart and pitch-pine. Its concrete walls are faced with blue brickwork, of which also the masonry of the invert entirely consists. Bramley Fall stone has been used in the quoins of the caisson grooves and in the skewbacks, and Cornish granite for the hollow quoins, pointing-cill, roller-paths, and coping. The stones used are of the same massive character as the other portions of the work, some of them weighing as much as 18 tons. Two swing plate-girder bridges cross the lock, each being sufficiently wide to accommodate at the same time any amount of ordinary traffic, whether by rail or road. Hydraulic power is being supplied to various parts of the old and new docks, and will be used for swinging the bridges over the new lock, opening and closing the gates, working the capstans and the penstocks, &c.

Two years ago the site on which the dock has been constructed was occupied by agricultural land, reclaimed from the old bed of the river Ouse, the level of which was something like 5 ft. below high-water mark of an ordinary spring tide. The lock has been built across the bed of the old fisher fleet, the harbour for many years of the fishing-craft of Lynn, and the locality altogether has undergone such an entire transformation that very few of its original features remain. To a large extent the work of excavation has been effected by the use of two of Ruston & Dunbar's steam navvies, one of Priestman's excavators, four locomotives, and an endless variety of other plant. The ground, on being first opened out, seemed likely to cause endless difficulty in its removal.

It consisted of raw silt, full of water; but, by degrees, incessant pumping told its tale, and the ground became firm and dry. At the level of the dock-floor the blue boulder clay was reached, and upon this foundation the whole of the superstructure has been reared.

The engineers are Messrs. J. S. & F. Valentine, of Queen Anne's Gate, Westminster, of whom the latter has been resident engineer, assisted by Mr. Henry Stockman. The contractors are Messrs. S. Pearson & Son, Mr. C. A. F. Gregson being their engineer. The swing-bridges have been made by the Cleveland Bridge and Engineering Company, Darlington. The Portland cement was supplied by Messrs. Francis & Co. and Messrs. Burge & Barron, both of London. Messrs. Abbott & Co., of Gateshead-on-Tyne, are the contractors for the hydraulic work, and Mr. C. Dennis, of Lynn, has been clerk of the works.

THE CONNEXION BETWEEN THE ARTS.

This was the subject of a lecture delivered on the 2nd inst., in the Victoria Hall, Glasgow (under the auspices of the Glasgow Sunday Society), by Mr. Ford Madox Brown.

The lecturer said that in choosing such a subject he did not wish to go into the matter philosophically, but rather to call attention to the undeniable evidence which they saw around them as lovers of art, as patrons of art, and in a sense as masters of art, of the importance of considering the arts in their various aspects generally, rather than investigating, as was more usual, one particular point. The fine arts were usually limited to four,—Poetry, Music, Painting, and Architecture. The French Academy, it was true, admitted a fifth,—Dancing; but that evening he would omit the consideration of the latter branch. In its place, however, he would substitute another, which was more indigenous to us,—Decorative Art. For the purposes of illustration, he must widen the definition of poetry so as to include all imaginative literature; for poetry, whether got up in "feet," or verse, or stanzas, or merely uttered with the subtle cadence which they found in Carlyle's "French Revolution" or Walt Whitman's "Drum Taps," was still poetry, whatsoever its mere form. Science asked,—"Why not join hands? You shall be as ourselves." They could not join hands, however, but say with the French, "Art for itself." Art was a reflection of the universe. Whatever was beautiful in the universe, whatever was terrible, whatever was sad, found its expression in art. But in saying that art had hitherto stood alone, he did not wish in this age of science to be understood too literally. Art was to a certain extent indebted to science in connexion with the study of anatomy in sculpture, harmony in music, and chemistry and perspective in painting and architecture; but still art would continue to flourish in the absence of all these. Speaking of the aids to the study and interpretation of the arts, he mentioned that he had lately visited Paris for the purpose of purchasing a set of the best-known casts of ancient sculpture for the Manchester Museum, and as the set only cost 500*l.*, he thought that no important city ought to be without one. The art student in England had many opportunities for study afforded him in the national collections, and the autotype process brought within his reach examples of Continental treasures showing most truthfully the touches of the great masters themselves. In music much progress had been made within recent years in this country, and Mr. Mackenzie's "Colomba" was an admirable example of the new school. Musical festivals in all the large centres were now given, at which the works of the greatest composers were performed to perfection. While in Amsterdam lately he was surprised to hear Wagner's music played on a street organ,—a great improvement upon what was usually discoursed in this country upon these instruments, and even by such means any one might be struck with the beauty of a composition, and led to seek to know it better. He then alluded at some length to what translators had done to admit of the classics, and the works of the most noted authors of all countries, being studied in English. While in olden times every school of art had its distinctive features, in modern times all the poets and painters agreed in rendering the ideal in a scrupulously truthful manner. In music there were precisely identical ideas, and, in short, there was no divergence now between the arts of any country. The leading poets of England, France, and Germany, and the greatest painters and sculptors seemed, without exception, to have identical aims, only varying in degrees of power to carry them out.

The Chairman (Professor Nichol), in proposing a vote of thanks to the lecturer, said he did not think that 500*l.* could be better spent than in purchasing and arranging in some great public hall in Glasgow the magnificent set of antique casts to which reference had been made.

TRADE UNIONISTS IN FRANCE.

The report of the deputation appointed by the Parliamentary Committee of the English Trade Union Congress to attend the International Workmen's Conference held in Paris in October has just been issued. It is signed by Messrs. Bailey, Burnett, and Broadhurst, M.P., and contains some passages of interest. After describing the constitution and proceedings of the conference, the writers say:—

"Our time was too much occupied with meetings to admit of much investigation into the number, the extent, and strength of the Paris trade unions, but, so far as we could gather, it appeared that the compositors, the engineers, the smiths, and the carpenters possessed the best unions. Even these cannot be compared with the British unions in stability or discipline.

The difficulty appears to be to get them to pay contributions of more than twopence a week. Even this sum is only paid by a comparatively small number of the men. The masons' delegate stated that out of some thousands of masons who accepted the principles of their society only about sixty men were regular subscribers. From this statement, and from other things which came under our observation, it would appear that the numerical strength of an association is reckoned upon the basis of the number of those in the given trade who approve of the objects of the union, and not upon the number of those who contribute to the funds, such as they are. It was upon this loose condition of things that the English delegates made their strongest attack, by stating the condition of membership in Great Britain and appealed to the members to exert themselves in making the societies more solid and numerous.

From what came under our notice, we are of opinion that the condition of the workpeople (*i.e.*, the mechanics) in Paris is not so good as that of corresponding trades in Great Britain. We met an English mason in Paris, who is engaged by an English firm of contractors at the erection of a Protestant church. He informed us that he was receiving London wages (viz., 9d. an hour), out of which he paid 18 francs a week (15s.) for a furnished room, firing, and the use of a kitchen, the latter shared among three families. A shoemaker, who was a delegate at the Conference, said that men in his trade were working fourteen hours a day for 3½ francs (2s. 11d.).

These, and similar statements made by other delegates, in reference to some of the provinces of France, would seem to prove that the condition of other French workpeople in the large centres and at large works is anything but an enviable one.

With the exception of a wish to rely upon the State for things they may do for themselves, we did not object to the general views of the French delegates on social questions.

The speeches of the French delegates contained constant reference to and condemnation of the *bourgeoisie*,—*i.e*, the middle classes. It would appear that there is little or no intercourse between the workmen and the middle classes in France, and the former, therefore, look upon the latter as their natural enemies; but we are bound to say that the want of intimacy is not only obvious in the cases referred to, but it is also true, to a lamentable extent, between the various groups of workmen themselves. We are painfully alive to the differences between workmen in our own country, and to its deterrent effect upon our thought and progress, but, happily, it does not exist here to such a degree as it does in France."

Dilapidations.—The official referee has just made his award in the case of Galpin *v.* Hussey, the plaintiff being the enterprising publisher and the defendant, Mr. Hussey, of the firm of Law, Hussey, & Hulbert, solicitors. The claim was for 87*l.* 6*s.* 8d., but it was stated that this was less than should have been claimed. The surveyors called for the plaintiff were Mr. Christopher and Mr. James Edmeston: for the defendant, Mr. K. D. Young and Mr. Banister Fletcher. The award gave 15*l.* 13*s.* 2d. being the amount of the valuation of defendant's surveyor, the plaintiff to pay all the defendant's costs of the reference. This case illustrates the wide margin of possible difference which seems too often to exist between plaintiffs' and defendants' surveyors.

BUILDING PATENT RECORD.*

APPLICATIONS FOR LETTERS PATENT.

5,493. F. Leslie, London. Chimney-cowls and ventilators. Nov. 23, 1883.

5,513. R. Evans, London. Flues, &c., for high buildings. Nov. 24, 1883.

5,526. H. Hancock, London. Fastenings for doors and windows, &c. Nov. 26, 1883.

5,527. J. H. Reynolds, Troy, U.S.A. Ventilators and chimney-cowls. (Com. by A. J. Robinson, Boston, U.S.A.) Nov. 26, 1883.

5,576. T. H. Feilding and A. N. Jonsen, Sydney. Covering buildings to afford protection from heat, &c. Nov. 29, 1883.

NOTICES TO PROCEED

have been given by the following applicants on the dates named:—

Nov. 27, 1883.

3,775. T. W. Webber, Kellyville, Athy. Construction of roofs. Aug. 1, 1883.

4,109. J. C. Kent, Bedfont. Supplying disinfectants to water-closets, urinals, and drains. Aug. 24, 1883.

Nov. 30, 1883.

3,647. A. Mechan, Glasgow. Ventilator cowls, &c. July 25, 1883.

3,648. F. W. E. Braid, London. Fire-resisting doors, &c. July 25, 1883.

3,656. W. B. G. Bennett, Portswood. Automatic flushing-apparatus. July 25, 1883.

3,675. R. Martinez, New York, U.S.A. Mats or floor-coverings. July 27, 1883.

3,761. T. Griffith, Manchester. Stair pads. Aug. 1, 1883.

ABRIDGMENTS OF SPECIFICATIONS,

Published during the week ending December 1, 1883.

1,757. F. Ramsay, London. Manufacture of wall-papers. April 7, 1883. Price 2d.

To imitate marble on the paper a tracing is taken of the veins, &c., in the marble, and from this tracing is cut out a perforated sheet. The paper first has a coating of "albumine," and the colours required are then roughly put on in water-colour. The perforated sheet is then placed over it, and the colour under the perforations is washed off. (*Pro. Pro.*)

1,762. R. H. Reeves and S. Reeve, London. Construction of flues, chimneys, and grates, for smoke-consuming and ventilating purposes. April 7, 1883. Price 6d.

Instead of a flue from the fireplace to the top of the building an air-shaft is made leading from the basement to the top, both ends of which are open to the external air. This forms a hollow chamber behind the fireplace in which the air is heated. The smoke, &c., passes from the fire through perforations in the back into this chamber, where it is consumed, the heated air being checked in its upward passage by plates or perforated fire-lumps above the chamber. A pipe opens into the upper part of the room, and is led down into the hot chamber, where it terminates in a coil, and the vacuum formed therein by the hot blast draws the vitiated air down out of the room.

1,773. C. E. Osborn, London. Construction of glass roofing for greenhouses, &c. April 9, 1883. Price 2d.

The upper edges of the top sheets of glass are inserted in a groove cut in the top bar, and the lower edges rest on the first purlin, being kept in position by nails or screws. The next row of glass sheets is inserted in a groove cut in the side of this first purlin, and the lower edges rest on the second purlin; and so on. (*Pro. Pro.*)

1,782. H. A. Walker, London. Window-blind rollers, and parts connected therewith. April 9, 1883. Price 6d.

The blind-cord passes through an eye in one end of a lever pivoted on the bracket, on the other end of which is fitted a friction pad or roller. When the cord is pulled the pad is lifted, and the blind-roller is free to revolve, but when the cord is released the pad falls by its own weight on the flange of the blind-roller, and prevents its revolving.

1,821. T. J. Baker, Newark. Chimney-tops and ventilators. April 10, 1883. Price 6d.

This is an improvement on Patent No. 3,416, of 1882, in making the tops, &c., of clay or terra-cotta, and in various alterations in their shapes.

1,843. R. Oakley, London. Combined deflecting and injecting exhaust roof ventilator and chimney-cowl. April 12, 1883. Price 8d.

A head is formed with four or more compartments open to the wind in different directions, the sides of all which meet in a common centre. Below is a tube divided lengthwise into corresponding compartments, these being severally in connexion with the compartments in the head. The tube is contained in the main shaft, and is closed at the bottom, but two nozzles project upward into the shaft, from the bottom of each compartment. Thus, any air driven down the head passes into the main shaft in an upward direction, and induces an upward draught. The main shaft terminates a little below the head, and round this open space are a series of circular deflectors, which prevent any air from entering.

1,845. R. Oakley, London. Ventilating-stove. April 12, 1883. Price 4d.

Between two horizontal plates are fitted a number of vertical pipes open at both ends. Just above the lower

* Compiled by Hart & Co., Patent Agents, 186, Fleet-street.

plate are gas-burners, which heat the pipes, and air, therefore, passes through them and is heated. The pipes are surrounded by a casing between the plates, whence the products of combustion are carried off by a flue.

1,846. R. Oakley, London. Appliances for ventilating churches, schools, &c. April 12, 1883. Price 6d.

A head is made somewhat similar to that above-described for Patent No. 1,843, of 1883, and the central tube leading therefrom, opens into a horizontal tube, across each end of which is a larger horizontal tube passing right through the roof, and opening to the external air at each end. From these depend the vertical tubes up which the air is exhausted from the building.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

SIR,—In last week's issue of the *Builder* the name of Mr. Alfred Smith, of the firm of Messrs. Smith & Arnold, architects, of Queen-street, Auckland, New Zealand, twice occurs with the affix "F.R.I.B.A." Permit me to inform you that there is no one of that name in the list of members of the Royal Institute of British Architects. A Mr. Alfred Smith, of No. 27, Southampton-buildings, Chancery-lane, London, was admitted a Fellow in 1851, and retired in 1859.

WILLIAM H. WHITE, Secretary.

No. 9, *Conduit-street*, Dec. 5.

*** It rests with Mr. Smith to explain how he came to send us his name with the affix of membership to it.

DWELLINGS FOR THE POOR.

SIR,—Last week we suggested, in a circular letter, the formation of a powerful philanthropic society, having for its object the erection of cheap houses for the poor, and showed that this can be done, if money is forthcoming, at about 4 per cent., without descending to charity *per se*; Lord Shaftesbury suggests something of the same kind in the *Nineteenth Century* for December; and this morning we are favoured with the information, from the Lord Mayor, that he will hold a conference on the subject in the Mansion House on the 11th December.

The subject, it would thus appear, is about to assume a practical shape, and leaving the question of money to the committee which is likely to be formed at the Conference, the various schemes may now be stripped of a great deal of extraneous matter which has hovered around them. For the present we may dismiss all Government and Municipal schemes, and questions of ground-rents and short leases, and the reduction of taxes and local water rates, &c., to the poor, and in the meantime cope with existing circumstances and surroundings, and so set ourselves to the problem, how the poor are to be best housed at rents within their means, and without the violation of economic principle, or with as little violation of them as possible.

The subject being so far cleared, it appears to us that it resolves itself into two schemes. The first is a well-tried scheme, for which we have precedent in abundance, particularly in Scotland, and which has been adopted, in some measure, by the Peabody and Artisan Buildings; but to bring this scheme within the reach of the poor we must not follow in the wake of the Peabody or Artisan model, but adopt more rigidly the Scottish type, which has been eminently successful for generations, and which we shall be happy to explain to any gentleman interested in the subject, we having had large experience in that class of property.

The second scheme is what may be termed the unfurnished hotel scheme, which consists of one large building with hundreds of rooms, let out as occasion requires. This plan is better adapted for a higher class of property; but we have no doubt it will suit the requirements of many of the poor, and has been recommended by Miss Octavia Hill, a lady who is not ignorant of the requirements of the lower orders of society. In both schemes the rents can be as low as from 1s. to 1s. 6d. per room per week, including all rates and taxes, and yet yield a profit of about four per cent. net.

GRAHAM & STEVENS, Architects.

5, *Air-street, Piccadilly*,
Nov. 28, 1883.

*** We print Messrs. Graham & Stevens's letter, at the same time expressing our conviction that all so-called philanthropic schemes will merely magnify the existing evil, which arises mainly from the recklessness of several generations of the poor themselves. It seems to be proposed to find cheap housing out of the pockets of philanthropists (for 4 per cent. is not really remunerative, even if it can be obtained from the rents indicated, which we more than doubt), for these reckless and improvident classes further to multiply. The idea of doing any permanent good in that way is an illusion. The evil which is now attracting attention is the work of some generations, and those who think that any patent philanthropic receipt will work an immediate improvement must be totally unable to understand the real facts and bearings of the case. An instructive suggestion as to the use that may be made of such cheap dwellings will be found in the communication from Manchester, in another column, in regard to the doings of the "nomadic householder." The ultimate cure is to be looked for in higher education and the development of thrift and self-respect among "the masses"; the only immediate weapon is the more strict enforcement of the legal duties of landlords. Beyond this, "supply and demand" must settle it.

CHAPEL BELL, LINCOLN'S INN.

SIR,—Seeing that you state in the *Builder*, Nov. 24 ("A Respite for Old London"), that the bell which hangs here was brought from Cadiz by the Earl of Essex, I beg to send you a copy of the inscription upon it (in raised letters), which I have been up and taken. Thos. Hitchcock was Treasurer in 1615. J. DOE, Chief Porter.

T
T H
+ ANTHONY BOND MADE
MEE
1615

*** Thomas Lane, a former Steward of Lincoln's Inn, published in 1823 a "Student's Guide through Lincoln's Inn," in which he states under head "Chapel,"—"The bell was brought from Cadiz in the year 1596 by the young Earl of Essex, the favourite of Queen Elizabeth, and formed part of the spoils acquired by the English under that gallant nobleman and Lord Effingham in the capture of Cadiz." Spilsbury, in his account of Lincoln's Inn (1850), gives the same story with more detail; he was a former librarian.

The most probable explanation is that the bell was re-cast in 1615, but the old tradition still kept on record. We and the public are indebted to Mr. Doe for taking the trouble to look at the present inscription on the bell, but the old story may be quite true nevertheless.

IRON AND CONCRETE.

SIR,—I am obliged by Mr. Emerson's and Mr. Thwaite's letters [see p. 704, *ante*], and am encouraged to adhere to my original intention of embedding a few iron rods near the bottom of the beam; gas-pipes would be stiffer against lateral thrust if the air enclosed in them would not lead to oxydisation. In either case, screw collars over the ends of the rods would connect one beam on to the next.

A beam 15 ft. long can be tested by Mr. Kirkaldy for 10*l.*, and, if the result be successful, a great economy will be apparent; for the cost of such a beam, made in a neighbourhood where suitable materials are at hand, should not exceed 5*l.*, and a column, consisting of an iron stancheon embedded in a fire-resisting case, such as Mr. Christian has used in the Economic Life Insurance Buildings in Blackfriars, would be worth about 15*l.*

There would, therefore, be an enormous saving in cost:—1, of material, as compared with the corresponding material contained in stone columns, at least 1 ft. 6 in. diameter, and in arches and spandrels 2 ft. 3 in. thick, reaching to a height of 19 ft. to the top of and including the usual stone string-course; and 2, of labour, which would consist merely in raising columns, 18 ft. high, into position, and then lifting the beams on to them and securing the ends together.

Besides this, if an arched clearstory be adopted to bring the weight on to the columns, there is no need for centreing even here, for the brick walls raised upon the beams would answer the purpose; so that the entire saving effected by this method of construction would be considerable.

Our clients, the clergy, usually shrink from any innovation in the architecture of their churches, which is a pity; for if they would dictate the exact arrangements of plan that they require, and leave us to carry out these arrangements with duly tested modern appliances, our architecture would again reflect its own period and no other.

Every past style *was modern* at the time it prevailed, though no style arose suddenly.

Our civil and domestic architecture is now settling down into a recognisable style, and it is to be hoped that it will not be convulsed by any more "revivals."

Concrete is already much employed in slabs and lintels, and it would be but a short step to its use in the form I have suggested.

The Jaina construction of covering in buildings with slabs is also possible with concrete, and we may become less and less dependent upon arches, which, however beautiful, "never sleep." EDWARD J. TARVER.

ENGLISH ENGINEERING IN GERMANY.

SIR,—Under the above heading you have, in your issue of the 1st of December, reproduced the introductory remarks of an article from the *Sanitary Record*, on the sewerage of Frankfort and the proposals now under consideration by the municipality for dealing with the sewage at the outfall works, which I shall feel obliged if you will allow me to correct, so far as it sets forth the name of Mr. Lindley only in connexion with the original works commenced so far back as 1866.

The full description referred to in your editorial note as having appeared about a year ago at pp. 388, 444, 474, shows, of course, that I was associated with Mr. Lindley in carrying out the original works; but in a matter affecting my professional career, and in reference to works on which I spent seven years and a half of time, I am sure you will see that it is only right that published descriptions of them should not appear without my name being associated with that of Mr. Lindley, sen., in connexion with the original works.

Mr. Lindley, sen., was not domiciled in Germany at the commencement nor during the progress of the works, as stated in the article, but I took up my residence in Frankfort to carry them out.

Mr. Lindley's sons have, for some years back, been resident in Frankfort, and the works are now in charge of the eldest son.

J. GORDON, M. Inst. C.E.,
Borough Surveyor of Leicester.

THE SEXTON.

SIR,—The casual reference to the word "Sexton," which occurs at p. 707 of the *Builder*, is most interesting; and there are other points in the short account of Chester-le-Street Parish that call for remark:—

1. As to the sexton. The extremely archaic form *Seggerstone* is valuable, being clearly a survival and very near approach to "sacriston," the primitive form; for, indeed, the simple sexton is only the more dignified sacristan somewhat fallen in life. The form "seggerstone" gives all three syllables due emphasis.

2. One would like to hear more about the stranger archbishop; but it is venturesome to hazard a conjecture in the absence of all date. I should have fancied he was a foreigner, say a Greek or Armenian dignitary, unless, indeed, it goes back to Catholic times; and that seems possible with a date so early as 1312.

3. The seats for wedding parties seem to indicate a period when the flooring was all open, *i.e.*, before the introduction of pews; no doubt, if the congregation had to kneel or stand, without even a *prie dieu*, a fixed seat for infirm and invalid females would be desirable, and such accommodation be accorded to wedding parties who would desire to keep together. A. H.

Nov. 30, 1883.

"QUANTITIES."

SIR,—I find it difficult to see exactly what your correspondent "E" is driving at in his letter to you in your last number [p. 738], but perhaps I should reply, as he makes the text of his letter my speech at the Builders' Benevolent Institution dinner. What I endeavoured to point out to the builders assembled at this dinner was that they should avoid architects who worked upon *the principle that quantity surveyors were unnecessary*. This advice to them I would still give, and still adhere to as strongly as ever, and I consider it the duty of all builders to refrain from tendering in competition for work unless quantities are supplied by a properly-qualified surveyor. There is no disagreement between most architects and myself in this matter: it is acknowledged by all capable of forming an unbiassed judgment that this course is the only fair one to adopt, and I trust the trade generally will be more and more firm in carrying it out.

J. HOWARD COLLS.

*** What our correspondent meant evidently was that the quantities were a matter for the builder's consideration, not for the architect's; in which, as a matter of principle, we agree with him.

Dublin Library and Museum Competition.—Mr. F. Hornblower writes from Liverpool that the design named as that of Mr. F. Holme, chosen among the first five, was sent in by himself in conjunction with Mr. Holme and under their joint names.

ELM-WOOD BLOCKS.

Sir,—Mr. White's answer on this subject (p. 738 *ante*) is valuable. We all owe a good deal to him in the matter of block floors, as well as in many other ways. May I ask, however, what is exactly intended by the words "but they [the elm blocks at Merifield used fifteen years ago] were 2½ in. thick"? Does Mr. White consider that they would probably have behaved differently if they had been thinner, say 1½ in. thick? Should 2½ in. (to put the question in another way) be considered the least thickness for elm blocks, if they are to be free from any risk of warping? P.

COMPETITIONS.

High School, Dunfermline.—A meeting of the promoters of the new High School and Dunfermline Burgh Board School has been held for the purpose of hearing a report by the committee as to the plans submitted in competition for the building. The Earl of Elgin, who occupied the chair, said that in the report it was recommended that the school should be built according to plans submitted by Mr. Mercer, in conjunction with Messrs. F. and G. Holme, architects, Liverpool, and in making that selection the committee thought that the idea of opening the school without debt would be accomplished. While they had the best authority for believing that the selected design would not cost over the stipulated sum (4,700*l.*), they had been assured by men of educational experience as to its suitability for a high school. The internal arrangements were good, while the building would be finished externally so as to make it an ornament to the town. The Rev. Dr. Mitchell moved the adoption of the Committee's recommendation. Ex-Bailie Walker seconded, and stated that he had been favourably impressed with some of Messrs. Holme and Mercer's work in Liverpool.

Stables, Buckminster Hall.—A correspondent says,—In the *Builder* for the 30th June last, there appeared an advertisement offering a premium of 50*l.* for the best design, and 30*l.* for the second best set of plans for proposed coach-houses, stables, &c., at Buckminster Hall, Grantham, Lincolnshire, for the Right Hon. the Earl of Dysart, the cost of the stables, &c., not to exceed 6,000*l.*, and the style of architecture to be in conformity with Buckminster Hall, which is of the Grecian Order of the "Georgium Sidus" period. In reply to this advertisement eighty-one architects sent in drawings! The first prize has been awarded to Mr. F. Eggar, of Wardrobe-chambers, Queen Victoria-street, London, and the second prize to Mr. R. C. Murray, 1, Racquet-court, Fleet-street.

Board School, Carlisle.—The *Carlisle Journal* states the circumstances under which the plans of Mr. G. Dale Oliver for the new Board School in Lowther-street were finally selected by the School Board, as already briefly mentioned in our columns. Mr. Paley, architect, of Lancaster, was called in to advise the Board upon the plans sent in for competition, but with the understanding that the Board would not necessarily be bound to consider his decision final. In the event, however, they did act upon his advice. He recommended the Board to adopt the plans bearing a Welsh motto if the whole of the schools,—boys', girls', and infants',—were to be built together; but if the Board should come to the conclusion that the schools had better be built separate then he recommended them to award the first prize to "Dux." The Board having decided that the schools should be built separate they followed Mr. Paley's advice and awarded the first prize to "Dux" (Mr. G. D. Oliver), and the plans bearing the Welsh motto (Mr. Scott's) were placed second.

The Vacant Land at the City End of the Embankment.—At the last meeting of the Court of Common Council, Mr. Manners moved the approval of a report from the City Lands Committee, stating that the Committee had accepted the offer of the Ground Rents Company (Limited) for a building lease of the vacant land on the Victoria Embankment, for a term of ninety-nine years from Christmas next, at a peppercorn rent for the first year, 5,000*l.* for the second year, 10,000*l.* for the third year, 15,000*l.* for the fourth year, and at 18,735*l.* per annum for the remainder of the term, with details of the arrangement by which the contractors agree to deposit the sum of 10,000*l.* as a security for the due execution of the contract; and recommending that the contract should be sealed accordingly. The report was adopted.

CHURCH-BUILDING NEWS.

Farnham (Surrey).—The Bishop of Winchester reopened the parish church of Churt, near Farnham, on the 22nd ult. The present nave is only some forty years old; but it was re-roofed, and a new chancel, vestry, and porch added, sixteen years ago. The nave has now been re-seated with pitch-pine open benches, and floored with deal blocks below the seats; and oak ones in the passages, having glazed encaustic tile bordering. One of Porritt's hot-air apparatus has been supplied. North and south transepts have been built, with White's patent hygeian-rock composition, to keep the wet from penetrating as it had done through both nave and chancel walls. A new oak entrance-door, with wrought-iron work by Brawn, of Birmingham, in a stone frame, has been supplied. A double western bell-gablet has been erected with three-light traceried window below it, and new windows placed in the nave to correspond, the stonework being supplied by Messrs. Pictor & Sons from their Westwood Quarry, the whole being glazed with cathedral rolled glass in varied delicate tints, with darker borders. The positions of font, lectern, and pulpit have been improved for the better, and a western gallery has been pulled down. The accommodation, however, has altogether been raised from 161 to 218. The work was commenced by Messrs. Goddard & Sons, of Farnham and Dorking, last July, and has been completed a week before the contract time. The total cost has been rather over 1,000*l.*, towards which both the Incorporated Church Building and the Surrey Diocesan Societies have subscribed liberally. The architect from whose plans and under whose superintendence the works have been carried out was Mr. E. H. Lingen-Barker, of Hereford.

Plymouth.—On Sunday last the new church built for the use of the officials and convalescent patients of the Royal Naval Hospital, Stonehouse, was opened for worship. The church is Gothic in style, and has been erected by Mr. S. Clarke, builder, of Plymouth, from the designs of the late Mr. Brighton, of the Director of Works' office, London. It is built of local limestone, with Portland stone dressings, and is elaborately ornamented with a great deal of carved stonework. The site is a slight eminence, to the east of the square block forming the ward buildings. The general entrance is at the western end, and is through a large porch of Portland stone, very elaborately carved, whilst at the other end are two smaller entrances, one leading to the vestry and the other for the officers. The chancel is apsidal. The clear-story has dormer windows. The chancel windows are of stained glass, and have been supplied by Hall & Sons, of Bristol. Round each of the windows is a great deal of elaborately-carved Portland stone. At the south-western extremity of the building is a bell-turret, surmounted by a spirelet, constructed chiefly of Portland stone, elaborately carved. The whole of the carving has been done by the convicts at Portland. The church is seated with pitch-pine benches, which have been made by the convicts at Portland. The gas coronæ have been supplied and fitted by Mr. Pile, of Stoke. The seating and other internal arrangements have been carried out by Mr. J. Berry, builder, of Plymouth. The font, which is placed under the bell-turret, is of Plymouth marble, and, together with the columns which support the chancel arch, and which are of the same material, is the work of the Portland convicts. The building will seat about 300 persons. It has been seven years under construction, and has been erected at a cost of about 4,000*l.* The work was commenced under the superintendence of Mr. Haite, superintendent engineer of the Devonport Yard, and since his transference from the Director of Works' office to that department, Mr. Richardson has carried out the duties of clerk of works. The church is provided with an organ, built by Messrs. Hele & Co.

Liverpool.—The foundation-stone of the Gustaf Adolfs Kyrka, a new Scandinavian church for Liverpool, was laid on Saturday, the 1st inst., by Mr. Samuel Smith, M.P. The building, of which Mr. W. D. Caröe, M.A., of London, is the architect, comprises a church to seat 550 adults, a large reading-room and lecture-hall in the basement, and adjoining is a residence for an assistant pastor. The architecture will, we are told, be a new departure from the types commonly seen in this country. The various simple characteristics of the early architecture of Scandinavia in its different developments in Denmark, Sweden, and Norway have been freely employed and united to form an at once harmonious, picturesque, and very inexpensive pile. Mr. John Shillitoe, of Upper Norwood, London, is the builder. The site is at the corner of Park-lane and Cornhill. The greater part of the funds have been contributed by the king and people of Sweden and Norway.

Bispham (Lancashire).—The re-building of the parish church is now completed, and the part just finished comprises the nave and south porch. The chancel, organ-chamber, and vestry were commenced some two years since. The old foundations of the nave and tower have been adhered to throughout, the addition to the former comprising one bay at the east end. Accommodation is provided for 311 persons. Externally the church is faced with Yorkshire parpoints and Longridge ashlar masonry, and internally with Stourton stone. The roofs are in one span, with open-framed principals, the ceilings being boarded. The chancel windows and several of those of the nave are filled with stained glass. The re-building throughout has involved an outlay of about 4,000*l.*, under the superintendence of the architect, Mr. John Lowe, Mansfield-chambers, St. Ann's-square, Manchester.

Miscellanea.

Proposed Canal from the Tyne to the Solway.—Plans for a canal from the Tyne to the Solway were submitted by Mr. A. Leslie to M. de Lesseps during his recent visit to the North. A few months ago a project was brought before the Newcastle City Council; and a committee was appointed to consider the feasibility of the scheme. That committee has not yet reported, and in the meantime Mr. A. Leslie has, with a view to testing the practicability of a Solway and Tyne Ship Canal privately drawn out three plans. Mr. Leslie is convinced that the canal is an actual necessity; and that its accomplishment is only a question of time. During six months of the year vessels cannot pass safely around by the north, and by the south there are many serious dangers, all tending to make the insurance fall very heavily on the shipowner, and, as a consequence, hamper trade. From the Tyne to Liverpool occupies no less than eighty hours with a good steamer, and it is calculated that by a canal the latter port would be reached in a considerably less time. The canal, if made, would be about sixty miles in length, and the run through it would occupy from twelve to twenty hours. Mr. Leslie, as has been said, has drawn three plans, the first showing a canal with an open cutting from sea to sea; the second, a canal with locks; and the third, a canal with two tunnels, one for easterly traffic and the other for westerly traffic, so as to prevent collisions. The tunnels would be situate near Greenhead, the most mountainous and most difficult part of the route from an engineering point of view. M. de Lesseps was strongly in favour of an open cutting from sea to sea.

Glasgow Architectural Association.—A lecture was delivered on the 30th ult. in the Room of the Association, St. Vincent-street, by Mr. John Honeyman, on the subject of "Air Currents as they are affected by the Form of Rooms." The president, Mr. Leiper, occupied the chair. Among the points urged was that if fresh cold air is admitted to a room at the floor level it will most surely be drawn off by the fireplace without any change being effected in the upper and warmer strata, while, moreover, the inmates will be subject to most disagreeable and unhealthy draughts. If admitted, however, at the ceiling, where the air is most vitiated, thorough ventilation is secured. It followed, therefore (according to the lecturer), that any height of ceiling greater than allows headroom clear of such current is wholly superfluous. We hope to print the substance of the paper next week.

Drayton Parslow.—The east window of the parish church has just been filled with glass by Messrs. Mayer & Co., of Munich, the subject represented being the Angel of the Resurrection appearing to the Women at the Sepulchre. The window has been presented by Mrs. Spurrell in memory of her husband, who was for twenty-eight years rector of the parish.

A New Method of Sinking Shafts through Quicksands is described and illustrated in the *Engineer*. It is the invention of Herr Poetsch, mining engineer, Aschersleben. It consists in actually freezing the quicksand or running ground to a hard solid mass, through which the shaft can then be sunk in the ordinary way without pumping, the external circular wall of ice left outside the excavation giving sufficient protection against influx of water, sand, or gravel, until the permanent masonry or iron lining is got into position. To accomplish this, after the shaft has been brought down to the level of the quicksand, a number bore-holes are carried down to the solid ground by means of a sand-pump. These holes are spaced about a yard apart, and are placed in circles, the outer one approaching as nearly as possible to the circumferential line of the shaft when finished. The bore-holes are then lined with iron tubes closed at the bottom, within each of which is a smaller concentric tube of copper open at the bottom and connected at top to a main-pipe communicating with all the other copper tubes and extending to the top of the shaft. The upper ends of the outer iron tubes are also connected to another main-pipe, which, like the other, extends to the surface of the ground. Through these pipes, brine, consisting of a solution of the chlorides of calcium and magnesium in water,—which has a freezing-point of about 36° below zero Fahr., is caused to circulate by a small force-pump driven by an engine, its course being down one of the mains and the internal copper pipes, and back through the surrounding annular spaces and the other main to the top of the shaft. At the surface is placed a cooling apparatus, preferably of the ammonia type, the refrigerator being inserted between the two sets of mains, so that the brine in its flow is continuously cooled to a temperature of about 15° below zero Fahr., before its passage down the shaft into the bore-holes. In this manner heat is rapidly abstracted from the quicksand or other running ground, which is thereby frozen into a hard mass, through which the excavation is continued as through solid ground, as before described.

Insanitary Property in Liverpool.—At the meeting of the Liverpool City Council on Wednesday, a lengthy discussion took place on the subject of the demolition of insanitary property, with the view to the improvement of the health of the low neighbourhoods and ameliorating the condition of the labouring classes and the poor. The Insanitary Property Committee submitted a resolution for applying to the Local Government Board for a provisional order for increasing the borrowing powers of the corporation by 200,000*l.* in view of an extensive demolition of insanitary property which is in prospect. Mr. A. B. Forwood moved the adoption of the recommendation. An amendment was moved by Mr. J. B. Smith for reducing the amount to 50,000*l.*, which it was contended was sufficient, in view of the fact that there was still a sum of 97,000*l.* available for the purposes in contemplation. In the course of the discussion Dr. Commins, M.P., said the cry of "Outcast London" and "Squalid Liverpool" was hollow and unreal, and the agitation that had been got up was most ridiculous. Because newspaper correspondents, who came from goodness knew where, happened to go into low districts of the city, and found an amount of drunkenness and squalor more than was accounted for by the police returns, it was thought that this was an extraordinary state of things and required extraordinary remedies. He asked why the existing local laws were not enforced? On a vote being taken the recommendation of the committee was carried by 34 to 5.

British Shipowners and the Suez Canal. It is announced that the Committee of British Shipowners and M. Charles de Lesseps have come to an agreement whereby the interests of British shipowners in the Suez Canal will be more adequately maintained than hitherto. The first article of the convention is as follows:—

"That to prevent delays in the transit between the Mediterranean and the Red Sea, and *vice versâ*, and also to provide for the expansion of trade, the company shall either sufficiently enlarge the present canal, or construct a second channel, as may be hereafter determined; and that in order to arrive at a proper decision as to the course which should be pursued in this respect, a commission of engineers and shipowners shall be appointed to examine the question, of which no fewer than one half shall consist of English engineers and shipowners."

An Enthusiast on Cremation.—It appears that the late Captain Hanham, who is stated to have been the "pioneer of cremation" in this country, has, to put it in an Irish form, lived to be cremated, and that the occasion has been one of intense interest to his friends,—so, at least, we judge from a letter which one of them writes to Thursday's *Times*, in which the contemplation of the consumption of the body by the new method seems to have stirred the writer (Dr. Comyns Leach) to a pitch of enthusiasm which it is quite refreshing to meet with in connexion with what is usually supposed to be a sad and solemn rite in any form. The contemplation of the "pure and sacred rite," the interest with which the remains and their gradual decomposition under the action of the "all-consuming and purifying fire" (for due note of which the furnace-door appears to have been occasionally opened) seem to have been regarded, the gathering up of the "snowy bones" afterwards, and the in-urning them with a couplet of Homer as a burial service,—all this is described, as our neighbours say, "with effusion"; and we may expect presently that cards will be issued for cremations. To our thinking the subject is an important but painful one, about which the less "gush" is written the better.

The Old University Buildings, Glasgow. The scheme for removing the ancient decorative stonework of these buildings to the principal entrance of the grounds of the new University, as advocated by Mr. Alexander George Thomson, I.A. (and referred to in our last number), has advanced with unexpected rapidity. The Senatus of the University having had before them Mr. Thomson's letter and design, resolved to remove the ancient gateway, under which so many generations of students have passed, to University Avenue, the estimated cost of the re-erection and of a suitable lodge attached being about 2,500*l.* These circumstances having come to the knowledge of Mr. William Pearce, the eminent shipbuilder, that gentleman, in the handsomest manner, at once offered to contribute the whole expense of re-erecting the gateway, and also of erecting the lodge to be connected with it. It is hoped that the projected operations may be carried out in the course of the ensuing summer.

The Housing of the Poor.—It is stated that the Local Government Board is about to address a circular to the metropolitan vestries drawing their attention to the powers that can be exercised by them under the Sanitary Act of 1866 in reference to houses let in lodging or occupied by members of more than one family. The circular will be accompanied by some model regulations dealing with the following matters:—The fixing of the number of persons who may occupy a house let in lodgings, the registration and inspection of such houses and the keeping the same in a cleanly and wholesome state, the enforcement of the provisions of accommodation and other appliances and means of cleanliness in proportion to the number of lodgings and occupiers, the cleansing and ventilation of the common passages and staircases, and the cleansing and lime-washing at stated times of such premises.

Roman Villa at Frilford, Berks.—A paragraph, which has gone the round of some of the daily papers, attributing to Mr. Parker the excavation of some remains of a Roman villa at the above-mentioned place, is not, it appears, altogether correct. Mr. Parker described it at a recent meeting of the Berkshire Archæological Society. The remains are said to indicate a villa of eight or ten rooms. Scarcely any vestige of the walls remains. A good many tesseræ have been found, indications of a concrete-lined bath, and the remains of a hypocaust.

Iron *versus* Stone.—Messrs. Measures Bros. & Co. send us, along with a memorandum of sections of their constructive ironwork, a photograph taken from the buildings in Cheapside after the great fire there, showing that the ironwork has stood its ground remarkably well, in this case at all events, many of the girders being *in situ* and nearly as straight as in their normal condition. One must know exactly the duration of time of the girders being exposed to great heat, however, before comparing this with other cases.

Tuam Cathedral.—Messrs. J. L. Bacon & Co., of Upper Gloucester-place, London, have been entrusted with the heating of the Roman Catholic Cathedral, Tuam.

Electric Lighting in the City.—The Streets Committee of the Commissioners of Sewers have resolved to recommend that the City be divided into five districts, comprehending the leading thoroughfares, for the purpose of electric lighting, and tenders are to be invited from various companies to carry out the work, which is to be done with as much promptitude as possible. This is in addition to one district for which a company has already permissive power.—*City Press.*

Old Putney.—Mr. Arthur Lucas sends us three etchings, by Mr. Evershed, of Putney Bridge and Church, and Fulham Church, subjects which are of some interest just now, when the old bridge is doomed, and other alterations in the neighbourhood are probably impending. Mr. Evershed, as an etcher, is thoroughly at home with old buildings, and not less so than usual here. We do not like his handling of trees so much, but the etchings have both artistic and topographical value.

Royal Academy.—The Gold Medal Students' Supper will be held at Willis's Rooms, on Wednesday, December 12th, at ten p.m. Mr. Edmund Woodthorpe, of 8, Beaumont-street, Portland-place, is acting as Hon. Secretary in the matter. It is expected that Messrs. George Grossmith, Edward Terry, Beerbohm Tree, and others, will lend their aid towards the evening's entertainment.

A Winter Garden and Lounge has been added by Baron Huddleston to his residence at Ascot, connected to the dwelling-house by a corridor. The work has been carried out by Messrs. Messenger & Co., horticultural builders, of Loughborough. The interior is fitted with rock-work and fountain by Messrs. Nieman & Cornish, of Orchard-street, London.

Backworth.—St. Edmunds (R.C.) Church, Backworth, near Newcastle-on-Tyne, has been opened. The building, which will seat 400 persons, is of corrugated galvanised iron, and has been built by Messrs. J. C. Humphreys, Albert Gate, Hyde Park, London. Its cost has been 300*l.*

Hospital Ventilation.—Amongst the buildings upon which Mr. Buchan's roof ventilators are at present being applied are the Epidemic Hospital in Edinburgh, and the Hospital for Incurables at Morningfield. An extra large ventilator, 5 ft. in diameter, is also being made by Mr. Buchan for a public hall at St. Andrew's.

Lincrusta-Walton.—In our account of the First Avenue Hotel we should have stated that this material has been largely employed in the decorative work of many parts of the building, notably in the reception and drawing rooms, and for nearly the whole of the corridors, and in the vestibule.

TENDERS.

For the remaining works to be done in the restoration of Gunton Hall, the seat of Lord Suffield, K.C.B. Mr. E. R. Robson, F.S.A., architect. Mr. W. H. Barber, quantity surveyor:—

	No. 1.	No 2.
Thompson, Peterborough	£14,981	£13,991
Brass, London	14,894	13,960
Higgs & Hill, London	14,690	13,694
Bentley, Waltham	14,361	13,676
Morter, Stratford	14,150	12,775
Boyce, London	13,978	12,550
Cornish & Gaymer, North Walsham	12,527	11,510
Foster & Dicksee, Rugby	11,888	11,1[illegible]8
Tomlinson & Sons, Sheffield	11,295	10,506

For building house and stabling, Herries-street, Kilburn-lane, for Mr. G. H. Cartwright. Mr. J. H. Taylor, architect. Quantities by Messrs. New & Son:—

F. Mark	£454 0 0
Varden & Son	433 0 0
Thomas & Butland	419 0 0
Facer	400 0 0
Dadds	395 0 0
Blades	370 0 0

For alterations and additions to stables, for formation of fire station, &c., for the Beckenham Local Board. Mr. Geo. B. Carlton, C.E., Surveyor to the Board:—

J. Hollingsworth, Penge	£929 0 0
D. D. & A. Brown, Camberwell	897 0 0
T. W. Jones, Beckenham	894 0 0
J. Barwell, Shortlands	842 0 0
J. G. B. Marshall, Brighton	800 0 0
T. Wootton, Penge	775 0 0
Bowdidge & Burley, Millwall	564 0 0

Accepted for erecting four shops at Blackheath, for Mr. Chas. J. Bond:—

Kennard Bros., Lewisham	£2,850 0 0

For alterations and additions to the New Forest Hotel, Lyndhurst-road Railway Station, for Messrs. Hine Bros. Mr. W. H. Mitchell, architect, Southampton:—

Chas. Pike, Totton	£946 0 0
H. J. Sanders, Southampton	941 0 0
Brinton & Bone, Southampton	910 0 0
J. W. Rowland, Southampton	875 0 0
Stevens & Sons, Southampton	861 0 0
J. Crook, Southampton (accepted)	837 0 0

For the erection of eight houses on the Cedars Estate, Walthamstow, for Messrs. Houghton. Mr. S. S. Walters, architect:—

Thompson & Tweed	£4,800	0	0
J. A. Taylor	3,899	0	0
Scott	3,784	0	0
Robson	3,672	0	0
Sampson	3,552	0	0
Barton	3,460	0	0
Goldsmith & Co.	3,400	0	0

For rebuilding St. George's Tavern, Coleman-road, Camberwell, for Mr. Haslar. Mr. Thos. W. W. Willes, architect:—

T. Boyce	£2,959	0	0
Williams	2,774	0	0
Colls & Son	2,768	0	0
Patrick & Sons	2,743	0	0
Payne	2,679	0	0
King & Son	2,400	0	0
J. A. Taylor (accepted)	2,299	0	0

For twelve small houses at Parkeston. Messrs. Whitmore & Reeves, architects and surveyors, 14, Devonshire-square, Bishopsgate:—

J. Harper, Hackney	£2,196	0	0
H. W. W. Gozzett	1,925	0	0
J. Gunn, Putney	1,800	0	0
Everett & Son, Colchester	1,799	0	0
Went & Bowen, Wimbledon	1,753	0	0
Saunders & Son, Dedham	1,748	0	0
G. King, Peckham	1,706	0	0
W. Wood, Chelmsford	1,694	0	0
W. Upson, Upper Dovercourt	1,650	0	0
J. T. Wilding, Dovercourt	1,600	0	0
W. List, Finsbury Park	1,600	0	0
A. Diss, Colchester	1,488	0	0
W. Betts, Clacton-on-Sea	1,464	0	0
J. Ayres, Woodford	1,380	0	0
T. Beckett, Dovercourt	1,355	0	0

For the erection of five blocks of artisans' dwellings, Petticoat square, for the Corporation of London:—

M. Gentry, Stratford (accepted)	£65,500	0	0

(For list see *Builder*, pp. 709, 744).

For warming and ventilating by their improved hydro-caloric system, the second block at Greenwich Hospital schools:—

J. Weeks & Co., Chelsea (accepted).

For building a new warehouse in Bloomsbury-street, for Messrs. G. Pearce & Co. Messrs. Spalding & Auld, architects:—

Patman & Fotheringham	£3,373	0	0
Donne	3,300	0	0
Dove Bros.	3,275	0	0
Ansell	3,243	0	0
Martin Wells & Co.	3,200	0	0
Outhwaite	3,139	0	0
Ashby	3,101	0	0
Roberts	3,093	0	0
Woodward	3,093	0	0
Grover (accepted)	3,088	0	0

For a Mission-hall in Denning-road, Hampstead. Messrs. Spaulding & Auld, architects:—

Staines & Son	£782	0	0
Gould & Brand	733	0	0
J. Grover	687	0	0
J. P. Donne	682	0	0
T. Sabey	680	0	0
Burford & Son	675	0	0

For rebuilding No. 8, Portland-mews. Messrs. Spalding & Auld, architects:—

J. P. Donne	£1,340	0	0
Outhwaite & Son	1,335	0	0
Staines & Son	1,322	0	0
Higgs & Hill	1,310	0	0
W. A. Rhodes	1,310	0	0
Martin, Wells, & Co.	1,294	0	0
Steed Bros.	1,247	0	0
Howard & Dorrell	1,235	0	0
Patman & Fotheringham	1,205	0	0
Ansell	1,194	0	0
J. Grover (accepted)	1,134	0	0

For additions to St. Margaret's, Streatham. Messrs. Spaulding & Auld, architects:—

W. Mason (accepted)	£1,474	11	6

For building three houses at Highworth, near Swindon, Wilts, for Mr. Ambrose Willis. Mr. William Drew, architect, Swindon:—

H. Looker, Stratton, St. Margaret*	£687	10	0

*Accepted.

For making up roadway of Cromwell-place, Highgate. Mr. T. de Courcy Meade, engineer and surveyor:—

McKenzie, Williams, & Co., Finsbury	£183	0	0
Dunmore, Crouch End	170	0	0
Pizzey, Hornsey	169	15	0
Jackson & Sons, Finsbury Park*	157	12	6

*Accepted.

For new Model Dwellings, George-square, Hoxton, for Mr. J. W. More. Mr. H. Goodwin Bailey, architect. Quantities by Mr. J. T. Carew:—

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Bulford	2,880	0	0
Parks & Roberts	2,850	0	0
Williams & Sons	2 783	0	0
Robson	2,473	0	0

For building a residence at Shiprods, Billingshurst, Sussex, for Mr. H. Mitchell. Mr. William Buck, architect, Horsham:—

Sharp, Horsham	£2,127	0	0
Pannett Bros., Horsham	1,950	0	0
Newell, Bognor	1,863	0	0
Etheridge Bros., Horsham	1,805	15	0
Taylor, Brighton	1,743	0	0
Terry, Storrington	1,667	0	0
Brown, Burgess Hill	1,667	7	6
Longley, Crawley (accepted)	1,659	0	0
Woolgar & Sons, Horsham	1,653	0	0
Morris, East Grinstead	1,552	0	0
Charlwood Bros., East Grinstead	1,324	0	0

For alterations and repairs to Nos. 33, 35, & 37, Southwark Bridge-road. Mr. Fred. M. Putley, architect:—

T. Rider & Son (accepted)	£1,538	0	0

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